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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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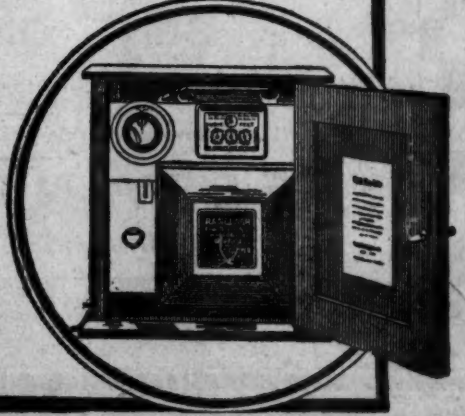

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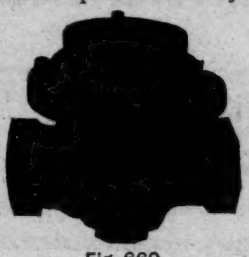

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VOL. CLXVII., No. 3202.] WEDNESDAY, SEPTEMBER 24, 1924. [76TH YEAR.

EDITORIAL NOTES.

Constitution and Qualifications of Boards of Gas Directors.

THE articles by "A Gas Engineer" on "The Present Position of the Gas Industry" were brought to a close in our issue of Sept. 3. The writer of those articles is a fully-qualified gas engineer with long official experience, and he preferred anonymity. Throughout, the articles have shown an independence in, and an originality of, thought—so original that in some respects the views of the writer do not coincide with our own. Hence the inclusion in the heading to the articles of the disclaiming words: "With the opinions "expressed in this series of articles, the Editor does not "necessarily associate himself." Nevertheless, welcome was given to the articles, because criticism from other angles of observation and experience than the general ones sometimes gives birth to new ideas which may lead to improvements or reformation in weak places. We rather expected that the articles would arouse an amount of discussion; but it has been a very busy year indeed for gas men. Possibly because of this, the only serious attack there has been, and this upon a single point, was the one made last week by Mr. J. H. Brearley. That point was the education and constitution of Boards of Directors. This is a matter upon which in times past we have commented, and anyone who remembers those comments will know that in certain respects our opinions do not agree with those of "A Gas Engineer." As a preface to what we are about to say, it may be remarked that in the gas industry a great change for the better has come over the Boards and Committees to whom is entrusted the administration of the gas industry. The conservatism of a past day has been replaced by an enlightenment of which there is splendid testimony in the 90 p.ct. gas supply support which is given to the National Gas Council, the "B.C.G.A.," and gas research work in the industry. Our friends the gas engineers could not, without their administrative Boards and Committees, render that support to the co-operative work of the industry. This fact alone assures us that to-day we have a body of gas administrators who are better educated in requirements than in the days before the doctrine of co-operation had its material advent in the industry.

However, "A Gas Engineer" urges that gas directors require educating, especially in the branches relating to distribution, and (we imagine) in this is included public service. But as Mr. Brearley shows, and we shall emphasize, our contributor was not logical in the presentation of his case; and, moreover, he did not indicate the ways in which Directors should be educated, other than through the "B.C.G.A." (which organization has done much to "educate" the members of Boards of Directors and members of Gas Committees by inspiring in them a desire to know), and by more being done by specialization in administration in the Press devoted to the gas industry. It may be of interest to "Gas Engineer" to learn that many directors in the gas industry and many committeemen are subscribers to the "JOURNAL;" and it may be of further interest to say that we have been surprised at the promptness with which complaint has been received when one of these subscribers has not received his copy, through loss in transmission. The position of the members of a Board of Directors is totally different from that of a local authority Committee, which is a mutable body. A director through continued service gains a considerable amount of experience; but this does not settle the question. In our opinion, it is not education that is required for the members of Boards of Directors, but proper and systematized selection, so as to get and to keep the right administrative constitution. The South Metropolitan Gas Company have made this question of composition and technical qualification a matter of legislation; but technical qualification is not confined to gas. It is an essential that gas should have, and very properly, primary place; but financial, legal, and business qualifications are also important. But gas making and distribution, and all that issues from the work, having foremost place, we hold with Dr. Carpenter and the practice of the Gas Light, Commercial, Tottenham, and other Companies, that good official service should not be a bar to continued valuable work for an undertaking, but that the objective should be a seat at the Board table, which, with the exception of the chair itself, is the highest honour a company can bestow. To follow "A Gas Engineer" to the logical conclusion of his argument, the more incompetent a man is in official capacity, the more suitable he would be as a director from the point of view of his successor, if not from that of the general interests of an undertaking.

The contributor of the articles, as Mr. Brearley points out, is not logical in this matter. He seeks for better education for members of directorates; and yet he would deny to gas officials reward for loyal and successful service, and shareholders and consumers continued recourse to the experience of the man who knows, from everyday dealings with the affairs of the concern, all the details of its ramifications. We are utterly opposed to such a narrow view. In the official we have the very education that is required; and the knowledge has been proved and tested. Yet our contributor would not take advantage of this. His reason vanishes on the application of the test of a large experience. It is a reason that discloses, in this particular, a narrow view. It is anything but a compliment to his fellow gas engineers, to whom becoming directors it imputes the danger of jealousy warping and swaying judgment in relation to the proposals of the successor in official position. An engineer builds according to time and opportunity. The successful engineer—and only successful engineers would be admitted to a seat at a Board—would desire to see the undertaking which he had guided with good result, progress from success to success. His ambition would be to help, and not to impede; otherwise he would not be worthy of recognition in the professional ranks. If "A Gas Engineer" has had experience to the contrary, then we are sorry he has been an exception to a common experience in several outstanding examples. We have on previous occasions talked over this matter with engineers who have predecessors on their Boards; and they have assured us that, through their help, they have got home schemes of advantage to the undertaking more promptly than they could ever have hoped to do working single-handed. The successful ex-official gas engineer will see the good points in his successor's proposals, and will desire to be as good a director as he has been official—in the interests of the undertaking. To suggest that such men are not fitted for directorships is a singular proceeding. If a gas directorship were offered to "A Gas Engineer," would he refuse to accept it through any fear that he would act unwarrantably, and veto the schemes of the gas engineer in office? We have our doubts.

The Harrogate Complete Gasification Plant.

THE interest originally raised in the Harrogate complete gasification system by its simplicity, efficiency, elasticity, and the fact that it is a development of the still most generally used horizontal retorts, will be largely accentuated by the contribution Mr. Frank H. Robinson, Assoc.M.Inst.C.E., the Engineer and Manager of the Harrogate Gas-Works, has made to this issue of the "JOURNAL." When he first introduced his invention to the gas profession, it was considered by some that it was then too early to form a definite opinion on its merits, especially in respect of repairs. That was more than four years ago; so time and experience can now supply, to the satisfaction of the most exacting for dependable data, the information that was required. It is obvious that our contributor has endeavoured in the present article to cover all the points that have been raised, and to furnish the additional particulars that experience has presented to him; and there is not the slightest doubt, if there are other items on which anyone reading the article needs elucidation, Mr. Robinson will be only too pleased to furnish the explanation.

It will be remembered that, briefly stated, the system consists of a setting of horizontal retorts fitted with the usual mouthpieces and ascension pipes at the outer ends, while the other ends are open but terminate in a chamber, the lower part of which forms a generator in which water gas is made. A good carbonizing temperature is obtained from the blow gases; the sensible heat of the hot water gas is used for direct carbonization inside the retort; the water gas sweeps the coal gas from the retorts; incandescent coke is supplied direct from the retorts to the generator, avoiding subsequent heating up; and the secondary air is heated by the waste gases. In such circumstances, a high thermal efficiency is assured. The elasticity of the system is an important feature. Being horizontal retorts, any class of coal can be carbonized; if it is desired to make blue water gas instead of mixed gas, all that has to be done is to cease charging coal into the retorts, shorten the blow, and feed coke direct into the generator. The experimental setting worked (with second-hand retorts) from August, 1920, to May this year, without any alteration other than enlarging the air ports, and introducing the air under the grate bars in two jets instead of one. Three new settings have been erected, which depart from the original design in several particulars, as described in the article. The system is now practically automatic, to the end that one man per shift does everything on the plant of three settings. From these the daily output of 370 to 380 B.Th.U. gas is 500,000 to 540,000 c.ft., or 175,000 c.ft. (650 therms) per man. This compares with 319 therms per man with machine-worked horizontals. Per day three men handle the coal, charge the retorts, clinker the generator, oil the machinery, and do everything required. From the labour and manufacturing points of view, these are excellent results. Besides, it is clear the duties are less arduous for the men, inasmuch as the weight of material to be handled per man is only 4·2 tons, compared with 9·2 tons with the horizontals. A further outcome is that the carbonizing costs per therm for the mixed-gas settings are less than one-half those of the horizontal settings in the same house, using the same coal, with three beds at work. There would, of course, be greater economy with a larger number of beds in operation on the mixed-gas system.

One of the main points upon which information was required, and which time alone could supply, was as to the cost of repairs. The only way to obtain comparative figures in this regard with a plant making mixed gas and one producing straight coal gas is to analyze the costs on the therm basis; seeing that from the mixed-gas plant there is a greater productivity. Days, tons, or cubic feet have no relative value in the circumstances. Mr. Robinson gives his actual costs; and with a yield of 187 therms per ton, the cost of repairs with the complete gasification plant works out to 0·11d. per therm, which compares with 0·21d. per therm for the horizontal retorts, assuming with them a yield of 65 therms per ton.

As to efficiency, the figures are good. The full data will be found in the article. Working two beds with automatic control, the gas made per ton was 40,849 c.ft. (corrected); and the average calorific value 425·5 B.Th.U. gross, or 174 therms per ton. With coal of a calorific value of 13,500 B.Th.U. per lb., the gas, coke, and tar together gave 224 therms per ton, or an efficiency of 74·02 p.ct. Allowing for steam and electricity for blowing, the net efficiency becomes 62·5 p.ct. The lowest calorific value was 421 and the highest 432 B.Th.U. gross, which is not a great variation. Working to a lower grade gas, a higher thermal efficiency, as the data show, can be obtained. Take a test in which gas was made of 279 B.Th.U. (suitable for diluting rich horizontal retort gas), the therms in the gas, coke in clinker, and tar gave an efficiency of 87·7 p.ct.; and after deducting the steam for the generator and electricity for blowing, the net efficiency was 75·2 p.ct.

Another interesting section of the article (which will receive a good deal of examination) is supplied by the tabulated working costs. In the case of the complete gasification plant, these, under the conditions described, work out to 1·82d. per therm, compared with 2·58d. per therm with the horizontal working. Precisely what these figures comprise is set out in the contribution. Upon them Mr. Robinson is to be congratulated. His continued working has proved all he originally claimed for his novel plant.

Pressure and Calorific Value.

IN the William Young Memorial Lecture published in our issue for Sept. 10 [p. 816], Dr. A. Parker towards the end alluded to the question of distribution when a change is made in the grade of gas supplied. He acknowledged that the subject of the conditions governing the velocities of the flow of gas in pipes is a complex one; and no doubt he was pleased to be able to refer to the classical contribution to the solution of these problems that Mr. Stephen Lacey, B.Sc., Distributing Engineer of the Gas Light and Coke Company, made to the Institution of Gas Engineers in 1923, and to which a valuable supplement appeared in our issue for June 18 last [p. 817]. No doubt limitations of time prevented Dr. Parker from dealing more fully with the question of the effect of varying the grade of gas distributed upon the pressure losses in the distribution system; and so far as his comments went, they are, of course, correct. However, there are one or two points to which further attention may perhaps be usefully directed.

The formula given on p. 821 of our issue for Sept. 10 may be described as a short way of stating that the loss of pressure in a pipe due to friction is directly proportional to the density of the gas and inversely proportional to the square of its calorific value. In the sentence which follows the formula, Dr. Parker refers to the effect upon the pressure required at the works governors of the readjustment of appliances rendered necessary by the reduction in the calorific value of the gas. Now this readjustment allows a reduction in the pressure needed at the gas nipples of the consuming appliances; and the reduction will, to some extent, compensate for the increased friction loss in the pipes between the distributing centre and the appliances. There are, however, two other factors at least as important as those mentioned, and which should be considered if it is intended to show the whole effect upon distribution of reducing the calorific value of the gas. The first and most significant is that increase in the friction loss in the pipes between the distributing centre and the gas-consuming appliances increases the *variation* in pressure at the appliances; and this question of variation in pressure in the system is of great importance. In order to appreciate this, let us consider a concrete example: Suppose that, when supplying a 500 B.Th.U. gas, it is necessary to raise the pressure at the distributing centre from a normal of (say) 4 in. to 6 in. at the peak load in order to maintain a pressure of 2½ in. at the extremity of the district. The variation at the consumers' appliances near the distributing centre, due to variation in pressure at the centre, will be 2 in. (6 – 4). If the calorific value of the gas were reduced to 400 B.Th.U., the loss of pressure between the distributing centre and the extremity of the district would be practically doubled—7 in., instead of 3½ in.; and even after allowing (say) 1 in. for reduction in pressure required at the consuming appliance with the lower calorific value, the maximum pressure at the distributing centre would have to be at least 10 in.—making the variation 6 in. (10 – 4), instead of 2 in. (6 – 4).

The second factor is the effect of increasing the rate of flow of gas through the meters. The loss of pressure through a meter is roughly proportional to the rate of flow through it, until a critical point is reached. If then the volume is further increased, the pressure loss increases much more rapidly, and oscillation begins. It is, of course, clear that if, as is usual, the majority of meters are being worked at the maximum demand periods near the critical point referred to, the reduction in calorific value of the gas supplied

will just make all the difference between adequate supplies and the reverse. As will be seen, these notes are not intended to be a criticism, but merely an amplification of what Dr. Parker said in the William Young Memorial Lecture.

Institution of Public Lighting Engineers and Superintendents.

THE newly formed Institution of Public Lighting Engineers and Superintendents had a good send-off in the mission of improving the standard of public lighting by the study of current requirements, which will in the future as in the past be subject to changes brought about by development in other spheres. Glasgow has always had a tender place in its civic heart for all organizations which bid fair to be in any manner of service to the community or to the country at large; and, when one visits the city, there is always assurance of a cordial welcome and the best of wishes for prosperity in the work in hand. Representative civic dignitaries came and welcomed and blessed the new Institution; and if this inaugural annual meeting is to be taken as a sample of what is to be, then we are prepared to say with confidence that excellent results are going immediately to follow its birth and to accompany its growth. The meeting was held under the presidency of Mr. S. B. Langlands, who, as the chief officer of the Public Lighting Department of Glasgow, is well known to our readers, and is a recognized progressive in his particular branch of professional work. With him were the Vice-President, Mr. R. Mason, the Public Lighting Superintendent of Birmingham, and Mr. W. J. Liberty, the Hon. Secretary, whose similar duties are centred in the City of London. To the latter the Institution are much indebted for his unceasing exertions in getting the organization planted firmly on its feet before the inaugural meeting in Glasgow; and he succeeded, with the aid of an excellent Council. At the meeting, it was seen that membership already includes most of the large towns; and with such a representation, the local officials responsible for public lighting in other cities and towns will feel that they ought to be in this good company. Clear it is that the advantages to such officials of association with a body of the kind—advantages which through them will be communicated to, and brought to bear upon, the public service in which they are engaged—cannot be ignored by any local authority whose functions include public lighting.

The proceedings showed that street lighting is an art, and the problems many; that in this public service there can be much waste through inefficiency; and that the highest efficiency attainable means economy. But when speaking of efficiency and economy, one must have regard to the current conditions of our streets, and the changed use that is made of them. It would be absurd to-day to compare costs with former times; and it would be a gross violation of prudent administration in the protection of the community to say that the standards of lighting prescribed a few years ago are sufficient for the present day. Glasgow does not shun comparison with other cities and towns in the matter of public lighting. Its streets are well and scientifically illuminated; perhaps Mr. Langlands knows quarters where improvements are desirable. Neither his Committee nor himself is prepared to stand still in this matter. Experiments are, as a matter of fact, being conducted with the view to ascertain how best to make improvements in certain localities. But Glasgow has a limit placed upon expenditure for public lighting. We do not object to such a limit, providing it is one which allows a margin for changing conditions, and beneficial higher standards where or if necessary. The total cost of the public lighting of the city last year—public streets, private streets and courts, and common stairs—was £288,004. This means, according to Mr. Langlands, that this year an assessment of 7·02d. in the pound is being levied—half payable by owners and half by occupiers. Under the terms of the 1914 Act, the Department must for all their work keep within 9d. in the pound. They still have a margin, but not a big one; and this explains why the city has no brilliant lighting. "Brilliant" was the word used by the President. Spectacular lighting is not required. Enough is as good as a feast. But the interpretation of "enough" in respect of public lighting is not always made on a scientific basis—in fact, the most haphazard guesswork is sometimes applied with the result that inefficiency, crudeness, and waste are found. A big glaring light may be an example of inefficiency just as may be a light that gives no better illumination than a candle. The Institution are going to work for better standards and service, which will not necessarily mean a greater expenditure, but better value for an approximately equal expenditure. There is much need for this, with the increased density of traffic in our streets, and with swiftly moving vehicles (when drivers get the opportunity).

A point in which Glasgow has set an excellent example is in the institution, some years since, of a laboratory in connection with the Public Lighting Department. That laboratory has paid for itself over and over again in the information it has supplied as to the values of lamps for the work required, and in respect of individual duty for given consumptions. It has enabled the picking unerringly of the good from the bad, the efficient and economical from the inefficient and uneconomical; and it has saved much money, or has been the means of giving improved service to the citizens without increasing expenditure—except, of course, such increase as has been occasioned by the lower purchasing power of money. Some years ago, when the laboratory was first instituted, the research work on burners effected a saving of £30,000 per annum in gas consumption. Gas is more expensive now; and therefore at to-day's values the £30,000 would be represented by a higher figure.

However, that by the way. The meeting showed the extent of the problems that have to be faced, and be dealt with by specialists, in connection with public lighting, as well as the vast amount of work that still has to be accomplished to bring this important public service everywhere up to the standards necessitated by the circumstances of the times. With the progress of invention and the claims arising from changes in the life and activities of our cities and towns, and along our highways, the work will continue to extend and grow in importance. Hence the great value that must come from conference by those responsible for the work. We welcome the new Institution as an excellent and wanted addition to our organizations.

The Gas Light and Brentford Amalgamation.

The announcement made in our editorial columns last week regarding the above quickly had repetition and extension in the newspapers; and the Stock Exchange saw in it cause for strengthening prices—particularly those of the Brentford Company's stock. It is further learned that, subject to the sanction of Parliament, the arrangement shall take effect as from Jan. 1, 1926.

Directors and Municipal Contracts.

Information is to hand that an appeal against the judgment of the late Mr. Justice Bailhache, in the action *Lapish v. Braithwaite*, has been entered, and will be proceeded with as quickly as possible. Application is to be made to expedite the appeal, in order that judgment may be obtained in time to be of some guidance to councillors and others whom it may affect at the coming municipal elections. The date for which nominations must be made for these is Oct. 26; and it is hoped to secure the hearing of the appeal before that date. The National Gas Council are in communication with the Federation of British Industries as to the steps to be taken in the event of Mr. Justice Bailhache's decision being upheld. The Central Executive Board of the former have the matter under close consideration.

Rating of Gas Undertakings.

The innovation which a certain rating luminary has introduced in considering the assessment for rating purposes of certain gas undertakings, seems likely to lead to trouble. The same attitude has been adopted by the same authority in other cases; and so the National Gas Council are obtaining the opinion on the matter of Mr. Tyldesley Jones, K.C.

A Gas-Works "Development" Promotion.

There are some promotions which on their very face tell an intelligent investor to beware. One such is the newcomer known as The Gas-Works Development and Guarantee Corporation, Ltd. We do not know anything of any of the Directors in connection with gas developments; but they evidently know of the good reputation of the gas industry among investors. The Chairman is Mr. A. Morley Everett; and he is Chairman of the Western Counties Incorporated Trust, Ltd., who are authorized to receive purchases of any part of the present issue. One of

the Directors is Mr. Ivor C. Kingdon, who is described as a "gas and electrical engineer." His reputation in that capacity has not, through some unfortunate miscarriage, reached us; and, raking over our memory, we cannot associate him with any great works or deeds in the gas industry. To be frank, we do not like the statements in the prospectus. They are designed in a fashion which appears to us to be too forcibly tempting. The offer is of 1000 10 p.ct. income bonds of £10 each, with a further participation in half the profits up to a further 15 p.ct. per annum, making a total of 25 p.ct. per annum. Ten p.ct. alone is handsome for bonds at par; but in black type we are told of the profitable nature of gas companies, who have paid "dividends varying from 10 to 17 p.ct. per annum, while their shares have reached premiums varying from 130 to 235 p.ct." Those dividends and those premiums do not refer to modern issues of capital of sliding-scale or maximum dividend companies. There are admittedly cases where they apply to original capital, which is comparatively small in amount and tightly held; but Parliament has exercised over later issues a fair control respecting the relations of gas capital and gas consumers. We believe most heartily in genuine gas investment; but we do not believe in obtaining capital by painting the attractions in too vivid colours. The security offered is as good as any commercial concern, and better than many.

The Purpose.

It seems that the Corporation has been formed for the laudable object of acquiring gas properties in order to develop and convert them into public companies. Those "gas properties" must be very insignificant ones. The present issue of bonds is made for the purpose of providing capital for "the flotation of a series of old-established gas properties as public companies which possess great possibilities for further and profitable development, and the Directors confidently believe these promotions will enable them to at once [*sic*] form a sinking fund—in addition to paying the 10 p.ct. interest on the income bonds—for the purpose of their redemption at £11 10s. per £10 bond," which redemption may take place any time after Oct. 1, 1926, by giving six months' notice. The promoters evidently think the investing public will have unbounded faith in them. "It is confidently anticipated [in the prospectus] that the first gas property the Directors are promoting as a public company will make an immediate profit of at least £4000; and the other options, which will be dealt with in due course, will reap a *similar* profit on each transaction." We should like to have the name of that "first gas property," and, if the Directors will oblige us with it, we will candidly express an opinion upon the prospects. We had no idea there were so many "gas properties" in the market as this prospectus seems to indicate. The Directors must have been very busy. They say they "have already secured options over some old-established freehold gas properties, as well as having had other advantageous gas propositions offered to them, and active negotiations are proceeding for the acquisition of more properties near London and in good country districts." That is drawing a long bow. There are no gas properties for sale "near" London. If the Directors have so many good things in hand, we strongly advise them to borrow the money—if they can offer the necessary security—from their bankers; and so retain the greater part of the profit themselves, instead of distributing it with such benevolent freedom among the public. So far as the public is concerned, our counsel to them is to invest their money in something with a better security than words. If the promoters would divulge more information, our advice might not be so definite; of course, it might be more so. At present we are retaining as a curiosity the "advance application form for preferential allotment."

Combined Gas and Electricity Supplies.

Attention has been called by the Electricity Commissioners through their annual report to the number of urban districts still without a supply of electricity. We recently noticed the inauguration of the supply of current by the Oakham Gas and Electricity Company. The matter of combining electricity supply with their gas-works is well advanced in the case of various local authority undertakings. The Port Talbot Council are considering tenders for plant and mains. The Retford Corporation have part of their electricity scheme sanctioned, and are waiting for the remainder. The Spalding District Council are about to run electricity in conjunction with their Gas Department under the Special Order for which they are applying.

Further Reduction in Motor Spirit.

One reduction in the prices of petrol and benzole has been promptly followed by another. The Combine Companies made a further drop of 1d. per gallon on the 16th inst., to operate only in the London Zone, which covers Greater London and certain of the adjacent counties. This reduction applies to all brands of spirit, including benzole and benzole mixture. The National Benzole Company, Ltd., have accordingly dropped the price of "National" benzole in the same area, so that its retail price to-day is: Delivered in drums, 1s. 9½d, per gallon; delivered in cans, 1s. 10½d.

German Coal and Exports.

The statement has been in circulation that orders from abroad are difficult to obtain by operators on the Newcastle coal market, owing to "the increasing sale of cheap German coal." The Secretary of the Mining Association (Mr. W. A. Lee), though not directly confirming the statement, says there is no doubt that Germany is making strenuous efforts to get back into the export trade. He also states that the miners in that country receive approximately the same pay as before the war, whereas the wages paid in this country are about 75 p.ct. above those ruling in pre-war days. Then in Germany eight hours and an hour overtime are being worked underground as against seven hours here. These facts indicate that, with coal to spare, Germany will have a good chance of underbidding this country for business abroad. What have the Miners' Federation to say to that? We know they are already much concerned regarding reparations coal. The Executive see ominous signs of the mining industry not being able to support the Federation's mass of members. There is no doubt whatever that the cost of production must come down; otherwise there will not be employment for a good proportion of those engaged in and about the mines of this country.

Coal in Sweden.

Coal is found in Sweden only in the southern part, in the province of Skane; the deposits being estimated at about 300,000,000 tons. The annual output varies round about 400,000 tons. The coal, being of the Mesozoic type, contains generally a rather high percentage of ash, is of a poor coking quality, and is not suitable for distillation. The relatively high-grade qualities are used by the railways and in local steam plants. The poorer qualities are used at the pits for firing kilns of earthenware and refractories, and to some extent for direct reduction of iron ore to iron sponge. Distillation of imported gas coal is carried out mainly in municipal plants for gas generation. Before the war about 260,000 tons of coal were distilled, producing 90,000,000 cub. m. of gas and 150,000 tons of coke. The coke produced is consumed in house-heating systems. Coking of coal for industrial purposes is only done in one case—the new coke and iron works at Oxelösund. Coke also is imported to the extent of about 500,000 tons a year. Pulverized coal is used only in the furnaces of the Portland cement industry.

Gas for Automobile Repairs.

Mr. W. H. Matlack, in the "American Gas Journal," advises the salesman who is desirous of developing his territory to keep his eye on the automobile repair and service shops, which offer many opportunities for small gas installations. Any shop where motor bearings are re-babbited is a prospective user of gas; battery service stations employ small gas torches and soldering furnaces; and where radiators are repaired there is a prospect for a gas-fired solution tank, to remove the grease and sediment from the radiator before it is repaired and again when it has been got ready for re-mounting. A tank is illustrated holding approximately 112 gallons of solution, which is about the amount the average small shop requires. Four burners, set about ¾ in. below the bottom of the tank, are about 48 in. long, and are drilled with two rows of $\frac{1}{16}$-in. holes at three-eighths centres. The consumption per burner of 570 B.Th.U. gas at 5 in. pressure is 106 c.ft. an hour. Another small industrial installation illustrated is for boiling-out radiators, and comprises a circulating gas water heater, an expansion tank, a small piece of glass tubing, a drain cock, and a few feet of hose. The glass tube should be fitted in such a way as to be protected from cold draughts. This tube is necessary so that the condition of the liquid used in the boiling process can be noted. It also shows the water circulating, so that one can readily see whether the system is operating. A suitable solution to use is concentrated lye. Care must be taken completely to wash-out all solution before finishing the job on the radiator.

PERSONAL.

Mr. L. E. TWYCROSS, who has been appointed Engineer and Works Manager of the Cheltenham Gas Light and Coke Company, was educated at Hanley Castle Grammar School, and was first initiated into the mysteries of gas making at Malvern Link and Upton-on-Severn Gas-Works, under the tuition of the late Mr. J. H. Lyon, at one time Manager of the Macclesfield Gas-Works. Later he was articled pupil to the late Mr. R. O. Paterson, and subsequently appointed his Second Assistant. When Mr. R. O. Paterson retired and his son, Mr. James Paterson, succeeded him at Cheltenham, Mr. Twycross was appointed Assistant Engineer. During the war, he served for four years in France in the 282nd Railway Co., R.E.

The Directors of the Cheltenham Gas Light and Coke Company have appointed as Accountant and Commercial Manager Mr. C. W. WELFORD, who, after spending some time in the Borough Treasurer's Department at Barrow-in-Furness, became, in December, 1919, Deputy Borough Treasurer of Weymouth and Melcombe Regis. He went to Cheltenham in April, 1923, as Cashier and Accountant. Mr. Welford is an Associate of the Society of Incorporated Accountants and Auditors, and a Fellow of the Royal Statistical Society. He holds Royal Society of Arts Diplomas in Advanced Commercial Law and Economics, and is an Exhibitioner in Industrial Economics.

We are informed that Mr. FREDERICK WATKINSON (who was until recently Managing-Director of Messrs. J. & W. B. Smith, Ltd.) has joined with Mr. A. J. ANDREWS, and that they have commenced business, under the title of Watkinson and Andrews, at Bank Chambers, No. 329, High Holborn, London, W.C. Both have had a very wide experience of the lighting business, and this it is their intention to turn to account in the fostering of British manufactures. The firm will specialize in gas fittings and lighting ware, and have secured the agency in London and the South of England for the well-known "Soutterware," made by Messrs. W. Soutter & Co., of Farm Street, Birmingham, who are experts in art metal work and fittings of every description.

OBITUARY.

By the death of Sir ALBERT E. BOWEN, Bart., J.P., who was well known in Anglo-Argentine business circles, the Primitiva Gas Company of Buenos Aires, Ltd., have lost a Chairman who has done an enormous amount of good work for the undertaking. Sir Albert was born at Hanley (Staffs.) in 1858, and spent many years in Buenos Aires. He was connected with a number of River Plate Companies. His death occurred last Friday afternoon at his country residence, Colworth Park, Sharnbrook, Bedfordshire. He leaves two sons and three daughters.

Our heartfelt sympathy, with that of his many friends in the gas industry, is extended to Mr. HERBERT LEES, J.P., of Hexham, in the great loss he has sustained by the death of his wife, after a month's illness, at the age of 61 years.

JOHNS HOPKINS UNIVERSITY.

Appointment of Professor of Gas Engineering.

The Johns Hopkins University have just announced the appointment as Professor of Gas Engineering of Dr. Wilbert J. Huff, lately of the Koppers Company, Pittsburgh. Dr. Huff has already assumed the duties of his new position, and will have charge of the organization and instruction of the new courses in Gas Engineering at Johns Hopkins University. [These were outlined in the "JOURNAL" for Sept. 3, p. 745.]

Dr. Huff was born at Butler, Pennsylvania, in 1890. He is an honours graduate of Yale College, and received the rating of Philosophical Oration, which is the highest honour awarded. He also received special honours in Chemistry. He took the degree of Doctor of Philosophy at Yale in 1917. While a graduate student at Yale, he was Henry Bradford Loomis Fellow, and during this period he was engaged in teaching.

Since the year 1917 Dr. Huff has been engaged in chemical and engineering research work of the Barrett Company, the United States Bureau of Mines, and the Koppers Company. He was a lieutenant in the Chemical Warfare Service in command of the Princeton research detachment. Since 1920 he has been with the Koppers Company in charge of the research division of their laboratories. He has had under his direction a number of men engaged in various research problems connected with the by-product coke and gas industry, some in the laboratory, others in the field.

In extending the invitation to Dr. Huff, the University acted only after very careful consideration of a large number of men who had been suggested as suitable for the new Chair, and after consultation with many experienced and influential men in the gas industry. The University feel that they have selected not only the best available man, but one having conspicuous qualifications in the fields of engineering practice, education, and research. During the past year Dr. Huff has been to Baltimore several times, and has conferred with the University authorities.

ELECTRICITY SUPPLY MEMORANDA.

IT is very generally acknowledged, as will have been gathered from previous references to the subject, that the outdoor electric lighting at the British Empire Exhibition does not come up to expectations. Some people have attributed this to the scheme that was originally contemplated having to be curtailed owing to shortage of power. The "Electrical Review" has published data as to the power station results, from which, as it says, it seems clear that the reason for "the flood lighting of the buildings (as ultimately carried out) falling short of the original scheme was not a shortage of electric power, as has been alleged." As usual, there is an excuse. Evidently the low reflecting value of concrete did not cross the minds of those responsible. This is gathered from the rather vague statement that "on account of the reflecting value of concrete not being much more than 25 p.ct., over twice as much light as that which suffices in the case of plastered or painted structures is needed to produce a good effect on a concrete surface with white light." Regarding the recent adverse criticism, our contemporary also harbours the idea that "no doubt many of the views that have been expressed are those of the prejudiced;" but it is admitted that the costly apparatus installed for the purpose of producing and controlling an elaborate coloured lighting scheme has never functioned. In our opinion, the reference to many of the views being those of the "prejudiced" is hardly fair, seeing that the gloomy monotony of the exterior lighting has not been approved by many electrical engineers who would, had they been satisfied with the effects, have been as free with their praise as they are, in the event, with their adverse criticism.

The Exhibition Electric Lighting.

Output Data.

The "Review" will permit us to take the following figures from the data as to the operation of the power station at the Exhibition. It first mentions that the consumption of electricity for power, lighting, and other purposes is considerable; and it is satisfactory to learn that the power station has functioned without giving cause for complaint. [This, of course, does not refer to the interruptions in the electrical service.] Three alternating current 1500 KW. turbo-generating sets were installed in the power house; while the North Metropolitan Electric Power Supply Company's transformer sub-station was built to furnish 2000 KW.; in addition, direct-current generating and sub-station plant aggregating 1000 KW. brought the total up to 7500 KW. During the first four months of the exhibition the three turbo-alternators produced 1,055,700, 789,800, and 763,000 KW.H. respectively, and the North Metropolitan Company's sub-station 1,950,195 KW.H., or a total of 4,559,295 KW.H. The boiler house has generated an average of 563,900 lbs. of steam per day, for fourteen hours' steaming, out of which 80,000 lbs. of steam has been sold per month to exhibitors in the Palace of Engineering, from which no return is obtained in the form of assistance in heating the boiler feed water. The average steam consumption of the turbines has been 13·5 lbs. per KW.H.; the machine with the best performance consuming 12·3 lbs. per KW.H. The total coal burned has amounted to 3709 tons, or 2·6 lbs. per KW.H. generated, or 3·22 lbs., covering all steam generated; the average cost of production being 1 2815d. per KW.H. It looks as though a gas-engine driven plant would have given quite a good account of itself in comparison. When the exhibition was opened, provision was made to cater for a total connected load of 11,500 KW. In August the maximum load curves indicated that the generating station carried 4200, the North Metropolitan sub-station 1600, No. 1 sub-station 1750, No. 2 sub-station 1000, and No. 3 sub-station 900 KW., or a total of 9540 KW.

Directors and Contracts.

A large part of the electricity supply of the country is in the hands of municipal authorities; a very considerable part of the gas supply is in the hands of companies. One result of this is that there is not in many cases open competition for the public lighting. The gas suppliers are placed in an inequitable position; and if the judgment of Mr. Justice Bailhache in the Leeds case is upheld, the inequality will be much accentuated. What will happen is this: So long as a gas company has a contract with a municipal body for gas, coke, or tar—one of these commodities or all—a director of the company cannot be a member of the Council; and thus the company as substantial ratepayers will have no voice or vote in the matter of local expenditure. The council could always keep the directors out of their constitution by having a small running contract with the company for one or more of their commodities. The company could not have a word said, or a vote registered, against electric lighting; but all the members of the electricity committee could vote against a contract being entered into with the gas company for lighting, and in favour of an electricity contract. There would be no check upon, nor could any weight be set against, the operations, however inadvisable, of the electrical side. Competent criticism would be effectually silenced. Thus it is seen that, should the judgment be sustained, those who supply the capital for a public enterprise, which is also a large ratepayer, will be severely penalized. The position would be altogether different and equitable were there no municipal trading in electri-

city, and both gas and electricity run by companies. But as it is, gas is in anything but an enviable position in respect of municipal patronage when the administration of the electrical undertaking causes a bias in its favour. When the two concerns are municipal possessions, we hear of no talk of complete conversions of the street lighting from one system to the other. The old law as at present interpreted) was not made to fit this condition of competition between a municipal trading concern and one privately owned.

Adjusting Tariffs to Purpose.

"Meteor" in the "Electrical Times" has been advocating the adjustment of electricity tariffs to promote new business. We were under the impression that every undertaking had, according to the lights of the administrators, arranged its tariffs for the purpose of securing business in every direction. He is aware that in some electrical quarters there is an impression that drastic reductions in lighting tariffs are necessary before any marked extension of the lighting business can now take place. But, in the lively imagination of our friend, the price charged for electric lighting is, as a rule, low enough to ensure for the electric lamp a position of decided economic superiority over its rivals; it is only the initial installation cost that stands in the way! It is really much more than that; but if those are "Meteor's" decided views, we will not quarrel with him over them, but let him live at peace with reflections as to an economic superiority with which so many are at variance. What "Meteor" has in mind as a policy is that the existing lighting prices should be maintained, or rather not reduced unnecessarily at the expense of other uses, "which really need the stimulus of cheapness." Put another way, because the "other uses" stand so badly in respect of economy in comparison with competing agents for cooking and heating, the lighting consumers, who are the backbone of an electricity undertaking, must be penalized. Though it is the truth, the confession of "Meteor" will not be appreciated in all quarters. His idea is, if there is anything to spare for effecting reductions, that it is better they should be made to encourage cooking and heating, and, if necessary, power. Poor lighting consumers! The position therefore is that, owing to the cost of electricity for cooking and heating, and the necessity for getting down to bedrock prices to do a scanty business in those branches, a higher lighting price must be paid than otherwise would be the case. Even then, there is not level competition with other agents. Take gas at 8d. per therm, and application to room heating. A penny will purchase 12,500 B.Th.U. The very common experience of a 20 to 25 p.ct. heat loss *via* the chimney, and 75 p.ct., or thereabouts, of useful heat to the room, means that the penny provides 9375 B.Th.U. doing genuine heating service. An electric fire with 90 p.ct. efficiency would require electricity to be supplied at 0·3d. per KW.H. to provide a corresponding amount of useful heat for a penny. Some gas undertakings are supplying at 5d. or 6d. per therm. At 5d., a penny would purchase 20,000 B.Th.U.; and 15,000 B.Th.U. would be given to a room as useful heat. Electricity would have to be sold at 0·2d. per KW.H. to compete. It is well to understand what are competitive prices before electrical people begin the process of tariff adjustment to purpose as advocated by "Meteor." It is no use making adjustments which promote unprofitable business and loss. The lighting consumer would then be doubly hit. In the case of municipal undertakings, "Meteor" urges that part of any surplus profits should be devoted to hire and hire-purchase schemes, and the remainder to the lowering of non-lighting rates. Wise administrators will think very carefully over the recommendation before taking the suggested leap in the dark.

At any Cost.

But why worry about adjusting tariffs just yet? It would perhaps be far more prudent for the electricity industry to concentrate on keeping a Labour-Socialist Government in power, and see what comes of it. A blind eye could be turned on their unhappy knack of doing things in the way of removing the little protection some of our industries have enjoyed, and helping to make employment for the workers in other countries to the detriment of those in this; in the way, too, of providing a Bolshevist governed country with a loan which authorities say will not assist our trade, and Germany with another big parcel of money to facilitate her strong *penchant* for dumping goods on our shores. When all this assistance is given to other countries, and they are over-running our markets with goods produced by cheap labour, our far-seeing Government propose to help the electricity industry to provide our own industries with electricity—electricity being considered the one thing needed for putting them in a better competitive position with other countries. It is not capital that is wanted, not cheaper coal, not cheaper materials, not labour willing to put in a fair day's work for a fair day's pay, and not a long period of peaceful and potent co-operation of all engaged in industry. Nothing of the kind; it is only electricity that will revive our industries. At least, all this is what we gather from the vapourings of some of our Ministers. That alone will bring about a better industrial state and more employment. Mr. Tom Shaw, the Minister of Labour, addressed a labour meeting at Heywood last Tuesday week; and he stated that the country which could most efficiently make goods would in future stand the best chance. He seemed to think that efficiency is concentrated in electricity. Efficiency stands on a wider basis in industry than is supplied by the power agent. That is only one of the items in a great number which combined constitute works and production efficiency. According to Mr. Shaw, electrical developments are inevitable, and the Government are trying to arrange a system in this country which will give the smallest village and town a chance of having not only electric light, but electric power. They are going to try to cover the country with a network of cables, enabling electricity to be utilized in every possible way. If, he says, the Government remain in power, and their schemes are reported to be practicable, they will not hesitate at the cost, but will go ahead with them. That is what Mr. Shaw declares. Some electrical men are praying that the industry may be saved from its Socialist-Labour friends. The taxpayers should join them in that petition.

Strikes and Electricity.

Whenever in London there is a strike in which by any means the electrical workers' unions think they can exercise some influence by pressure, they threaten to call out their men. The same thing happens elsewhere, to the disturbance of important communities. When there was trouble with the municipal workers in Dublin recently, the electricity workers joined in the strike, and so caused a considerable amount of inconvenience where the more reliable gas is not laid on. Vienna last week experienced much the same thing. The municipal electricians went on strike; and all patrons of the current suffered in consequence. The *modus operandi* of the discontented electricians was to tour the city in motor wagons, and systematically to cut off the current at the street mains. The hotels had a big exodus of visitors. Restaurants and cafés had to close early; and newspapers depending upon electrical energy for power were unable to publish.

JUNIOR ASSOCIATIONS AND THE EDUCATION SCHEME.

The inception and development of the Education Scheme has been much discussed by the Joint Council of the Junior Associations during the last six years. From this Council, representatives of the Juniors have been co-opted by the Institution's Advisory Committee, and much willing service has been rendered in this work. A meeting of the Joint Council was held in London on the 4th inst., when a report on the education position was submitted by the two Junior representatives on the Advisory Committee, Mr. J. Bridge (Elland) and Mr. S. B. Chandler (Tottenham), and they were very cordially thanked for their services during the preceding year. Mr. W. J. Pickering (Birmingham) was nominated to succeed Mr. Chandler, who resigned on his appointment as an Examiner under the scheme.

Mr. Walter Hole, the Organizing Secretary of the scheme, was invited to attend to discuss the need for the continuance of educational provision for those who, while anxious to improve their knowledge, are unable to go through the scheme, owing to lack of the necessary educational qualifications. The matter was very fully ventilated by various speakers, and it was decided that Mr. Hole be asked to put before the Advisory Committee the opinion of the Joint Council that such provision is necessary.

In addition to discussion of the various phases of the work of the Junior Associations, the Joint Council publish the combined Transactions of the five affiliated Associations; and it was reported that Vol. XIV. would shortly be issued to the members.

Heating and Ventilating.—A competition was arranged by the Institution of Heating and Ventilating Engineers early in the year to encourage education in the industry. The result has now been issued by the Council of the Institution. Interest seems to have been awakened in different parts of the world; and the "Lumby" Premium (£10 10s.), presented by Messrs. Lumby's, Ltd., of Halifax, was secured by an American, Mr. V. Nekrassoff, of Philadelphia, U.S.A. The "Sirocco" Premium (£10 10s.), presented by Messrs. Davidson & Co., Ltd., of Belfast, was awarded to Mr. Victor Matthews, of Bristol, and the "Preston" Premium (£5 5s.), presented by Mr. J. R. Preston, of Messrs. Mumford Bailey and Preston, Ltd., London, was awarded to Mr. H. A. Stirzaker, of London.

American Gas Association.—According to Mr. Alexander Forward, Secretary-Manager of the American Gas Association, increasing industrial and domestic demand for gas heat, on an unprecedented scale, has created a situation in the manufactured gas industry which the gas companies of the United States must be prepared to deal with in the near future. How this rapidly growing demand can be satisfactorily met, is one of the problems to be discussed at the forthcoming annual Convention of the Association, to be held in Atlantic City next month. "Opportunity" will be the keynote of the main sessions of the convention. It is recognized that the gas industry has more opportunities for usefulness to-day than ever before in its history. The opportunity to gain the active goodwill of the public will be the message of those interested in cultivating public relations; the opportunity of gas consumers to share in the prosperity of the industry will be discussed by the leading advocates of customer ownership; the opportunity of the manufactured gas companies to supply increasing quantities of gas fuel for house heating and for new applications to industrial needs will be analyzed by gas engineers who have surveyed the field.

FURTHER EXPERIENCES IN COMPLETE GASIFICATION.

By FRANK H. ROBINSON, Assoc.M.Inst.C.E.

On May 6, 1920, a paper was read, by the author of this article, at the meeting of the North of England Gas Managers' Association at Newcastle-upon-Tyne, on "Experiments in Complete Gasification at Harrogate." These experiments covered the previous eight months, and it was felt by some that it was too early to form an opinion on the merits or otherwise of the system described, particularly on the question of repairs.

Before dealing with the later experiences, it will not be out of place to give a brief description of the system. It consists of a setting of horizontal retorts fitted with the usual mouthpieces and ascension pipes at the outer ends, while the other ends are open and terminate in a chamber. The lower part of this chamber forms the generator where the water gas is made. The retorts are set in the usual way, and are heated by the blow gases from the generator. During the run, when water gas is being made, the water gas passes through the retorts, sweeping the coal gas being produced away up the ascension pipes to the hydraulic main. During the blow, the coal gas produced collects in the chamber above the generator until the change-over, when it is swept away into the mains by the water gas through the retorts. This chamber is large enough to contain twice the quantity of coal gas produced during the normal period of the blow. There is thus no waste of coal gas in this period.

Air is supplied from a fan through a 3-way piston-valve which simultaneously opens the primary air to the generator and the secondary air to the setting. Connected to the same lever are the snift or blast valve and the steam jet to the generator. If a steam-engine is used for the blower, the supply can also be connected to the one lever. In small single settings, a hand lever is provided, but on "through" settings a hydraulic cylinder is provided controlled by a 4-way water valve.

Where electricity is available, each setting may have its own fan and motor fixed under the setting, so that each setting is a separate unit, or one fan can be arranged for several settings. Any number or size of retorts can be arranged for, according to the dimensions of the arch available. The plant can be inserted in an existing arch provided this is sound in the brickwork, and no separate buildings are required. If foundations are bad and it is not possible to excavate to the required depth, the plant can be designed as a separate unit with a stage. When built into an existing arch, the old mouthpieces, ascension pipes, and hydraulic mains are utilized. The retorts are charged in the usual way and discharged by hand or machine by pushing out into the generator. All the tar and ammonia is recovered, the tar being similar to a vertical-retort tar. If blue gas alone is desired, the only alteration required is to cease charging coal into the retorts, and shorten the "blow," feeding coke direct into the generator.

As the retorts are horizontal, any class of coal may be carbonized which will produce a coke of reasonably good quality. Some plants require only nuts of a non-caking quality, or the addition of coke, to keep an open fuel bed in the generator. In this plant the coke is first formed in the usual way, and then pushed into the generator in a suitable condition for water gas making. Thus, a coking slack can be used just as well as screened nuts. This was done during the coal strike of 1921. All the valves are connected to one lever, and so no mistake can be made in the working.

The setting on which the first experiments were made consisted of 8 retorts, 14 ft. long by 22 in. by 16 in. Ω-shaped, machine charged. This was set to work in August, 1920, and worked until May, 1924, without any alteration to the setting other than enlarging the air ports and introducing the air under the grate bars in two jets instead of one, as in fig. 3.

When the blast entered at one side only, it was found that the air rushed up the opposite wall of the generator more than any other part, with the result that clinker formed on this wall, making it difficult to remove. With the two jets in opposition, the tendency is for the air to travel up the centre of the fuel bed. This was proved by someone standing in the empty generator with the doors closed and the blast full on. It was found that the strongest air current travelled up the centre; the velocity of the air near the walls being very much less. At the same time a reduction in grate area was also made. This further tended to keep the blast at the centre of the fuel bed, and to bring the clinker lower down. These are the only changes made in the setting itself. This setting was let down for renewals of retorts on May 23, 1924, after working 1214 days. All the retorts were second hand, having been taken out of a regenerator setting erected in 1894, but not worked much. One of these retorts collapsed early this year, so it was bricked up at both ends, and gas making continued with the other seven.

Another change made was in simplifying the air connections and getting rid of sharp bends and angles; but the most important change was the introduction of automatic control. After having had such satisfactory experience, three more settings of six retorts each were erected alongside the experimental setting, and advantage was taken of this to work them automatically. Each setting has now a hydraulic cylinder supplied from an overhead tank. To the piston of this are connected the 3-way air valve, the snift valve, and the steam supply. In the back position, the primary and secondary air passages and the snift valve

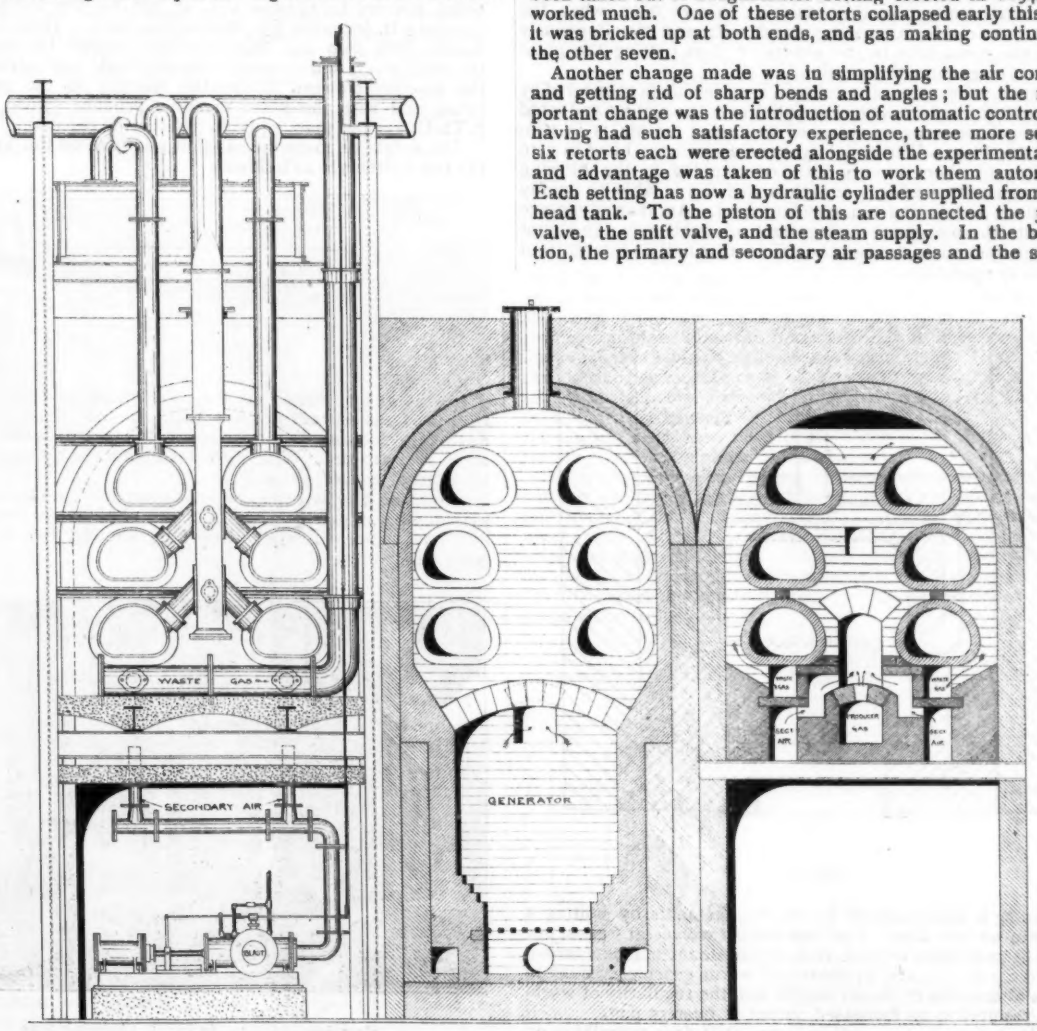


FIG. 1.

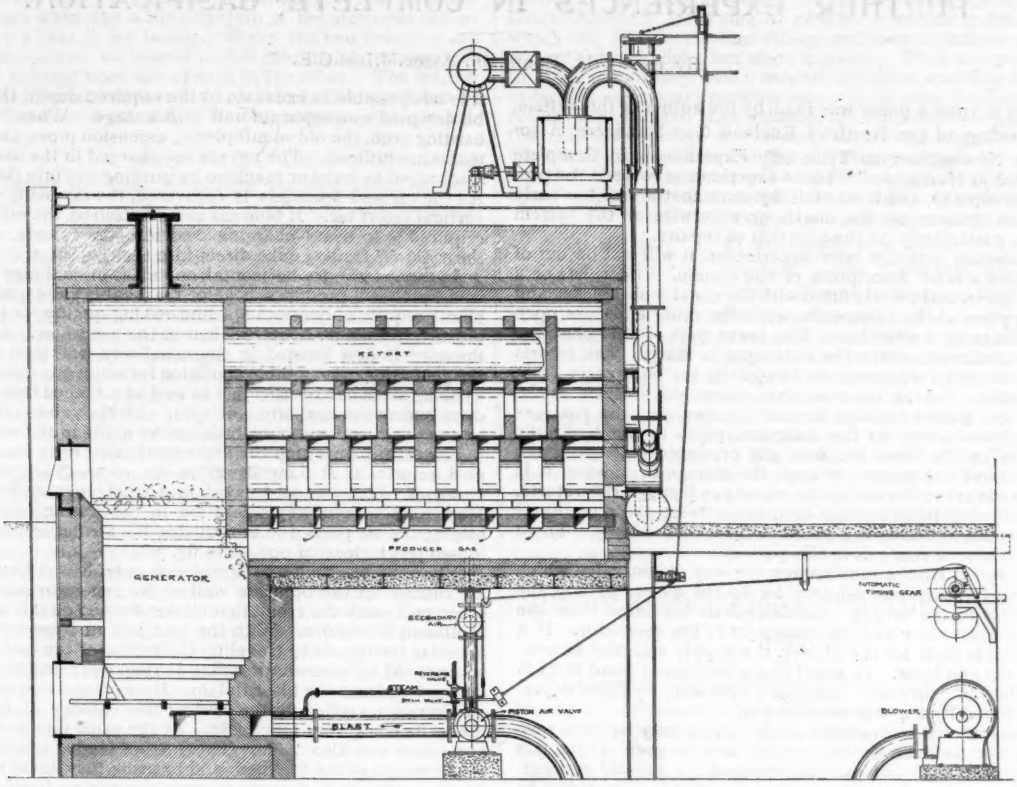


FIG. 2.

are open—that is, the "blow" position and with the steam shut off. A small water-reversing valve is thrown over, when the piston moves, closing air passages and snift, and simultaneously opening the steam cock to the generator, thus putting the plant in the run, or gas-making, position.

The small water-reversing valve in each setting is connected by levers and light rods to a shaft parallel with the setting and fitted with cams, these being so arranged that each setting is in turn put on the blow. With slightly over 2½ minutes blow in a 10 minutes cycle, there is very little overlapping in the blowing of the respective settings; and thus one fan is able to supply four settings and is under a constant load. Another advantage is that with three or more settings controlled this way, the output of gas remains much steadier than if a larger unit on intermittent work was in operation.

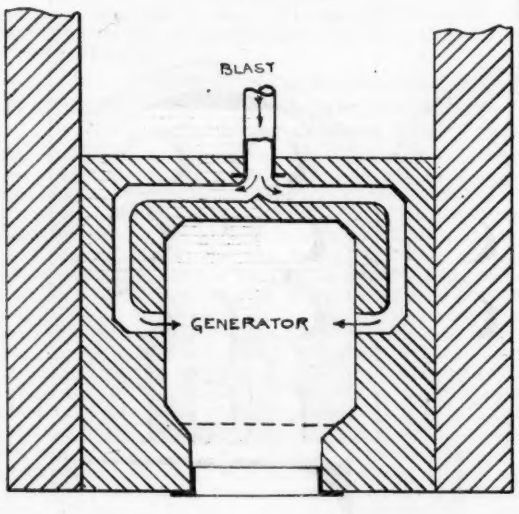


Fig. 3.

The timing is easily altered to suit requirements by bolting a small plate on the disc. The line shaft revolves at 6 revs. per hour. The reduction from a very small steam engine running about 140 r.p.m. is made by means of worm gearing running in oil. The alterations in the air supply and the regularity of working have resulted in an increased output of over 35 p.ct.

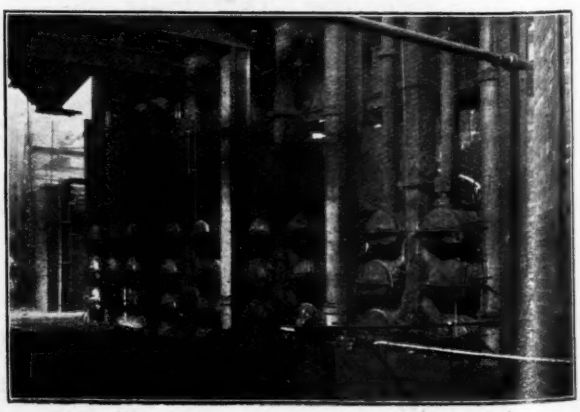
With the automatic gear, one man per shift does everything on the plant for three settings; the daily output of gas from these being 500,000 to 540,000 c.ft. of 370 to 380 B.Th.U. gas, or 175,000 c.ft. (equal to 650 therms) per man. Three men *per day* handle their own coal, charge retorts, clinker the generator, oil the machinery, and do everything required. Compared with this, the machine-charged horizontals working in the same retort-house and with the same machine produce 57,000 c.ft. of 560 B.Th.U. gas per man, equal to 319 therms per man.

The weight of material handled per man on the average with the two systems is as follows:

—	Mixed Gas Plant.	Horizontals.
	Tons.	Tons.
Coal	3·6	5 0
Clinker and pan breeze	0 6	0·8
Coke	..	3·4
	4·2	9·2

It will thus be seen that the carbonizing costs per therm for the mixed gas settings are less than one-half those of the horizontals in the same retort-house and using the same coal, with three beds at work. With a greater number of beds, greater economy is, of course, possible.

The three new settings erected departed from the original setting in several particulars. In some of these, an improvement was made, but subsequent working showed the weakness of other departures.



Complete Gasification Plant, Charging Side.

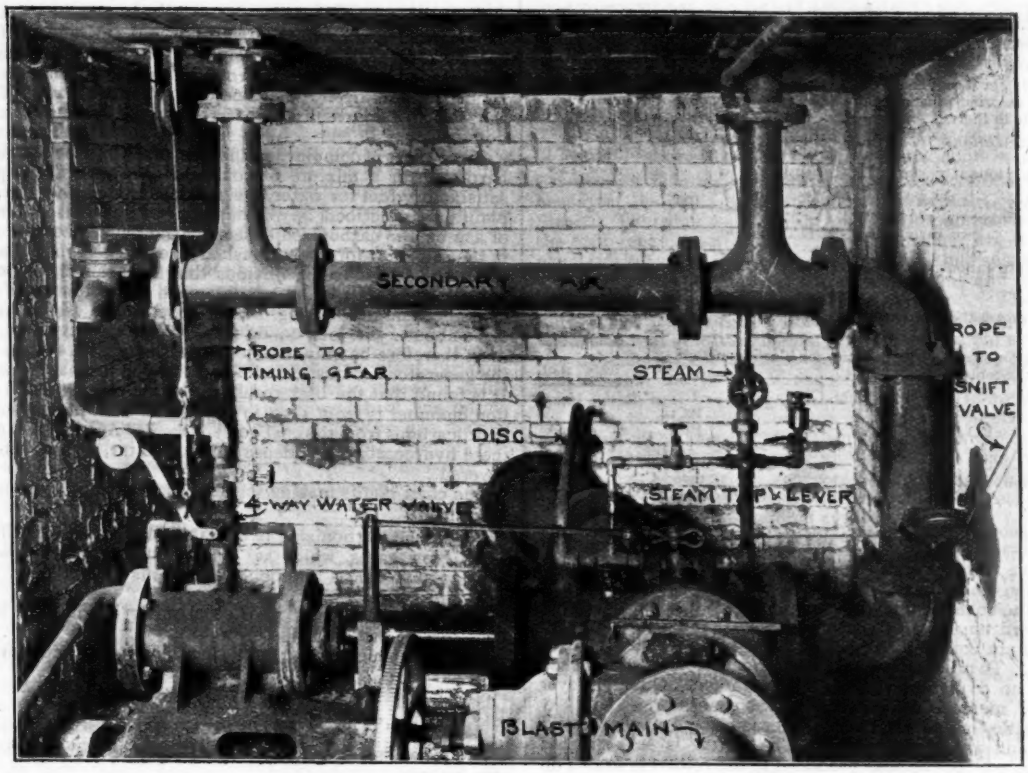


FIG. 4.—VALVE GEAR.

In the new settings, the secondary air is heated by the waste gases, while in the generator the back wall has been built vertical instead of inclined. Both these are improvements. The other alterations were in the ironwork, with a view to cutting down the cost of the plant. The outlet pipes from the retorts were connected into one common ascension pipe. This was led into a seal pot, as is the usual water-gas practice. While this arrangement reduced the amount of ironwork, and functioned successfully for a time, it was found that the size of the ascension pipe was not sufficient to take the rush of gas during the gas-making

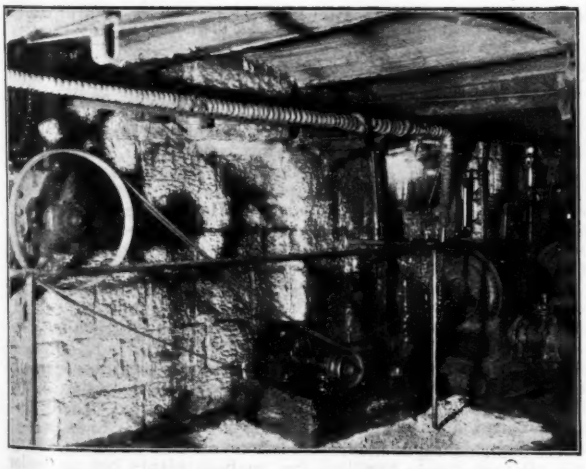


Fig. 5.—Automatic Gear.

period, when the hot water gas was driving forward the coal gas, with the result that stopped pipes became a nuisance. The small seal pot was therefore lengthened, and two separate ascension pipes and dip pipes were fixed to the top retorts. This removed the trouble. It has thus been shown that, for this plant where coal gas is produced simultaneously with water gas, the ordinary arrangement of one ascension pipe to each retort, and a hydraulic main of simple design, is the most suitable.

The extended experience obtained since the first setting was put to work in August, 1920, has shown that the system is flexible, simple, and reliable, while in repairs the cost is lower than for the ordinary retorts.

As mentioned before, the first setting worked 1214 days using second-hand retorts. With new retorts, the plant would have worked another year without a re-set. No repairs have been required to the timing and automatic gear, beyond the packing of glands and renewals of hydraulic cylinder leathers, since it was installed in July, 1922, while the four settings have only required pointing. Furnace repairs have been no greater than ordinary settings, as Dinas bricks were used for lining.

Since July, 1922, when the four settings were completed, the total repairs have amounted to £112—that is, for two years. The cost of re-setting the first arch this year will be £280. As the retorts would have a normal life of about 1500 days or more, each arch will need re-setting every five years, and so the cost per arch would be £56 per annum. Allowing for one setting having eight retorts, and three settings 6 retorts each, the total cost of repairs for the two complete years works out at £512 for the whole installation. In this period 5631 tons of coal were carbonized in the plant, giving a figure of 21·8d. per ton as the cost of repairs and renewals, against 13·73d. per ton for the horizontals. The latter figure is the average for 1915-22 inclusive (8 years) when prices were lower than the average for the last two years. As the yield of gas per ton is higher in the case of the complete gasification plant than the horizontals, it is necessary to count the above costs on the basis of the therm yield. With a yield of 187 therms per ton, the costs of repairs to the former work out at ·11d. a therm, compared with ·21d. a therm for the horizontals, assuming these to yield 65 therms a ton.

Frequent tests have been made which more than confirm the results given in the paper of May 6, 1920.

Since the alterations in the blast, mentioned previously, the charges are burnt off much quicker. The combustion-chamber temperatures are now from 1150° to 1250° C., compared with a maximum of 934° C. previously; the temperatures being read by means of a thermo-couple. Though there is an increase of 200° to 300° C. in the combustion chamber, the waste gases do not reach a higher temperature than 475° C., due to more complete combustion in the setting.

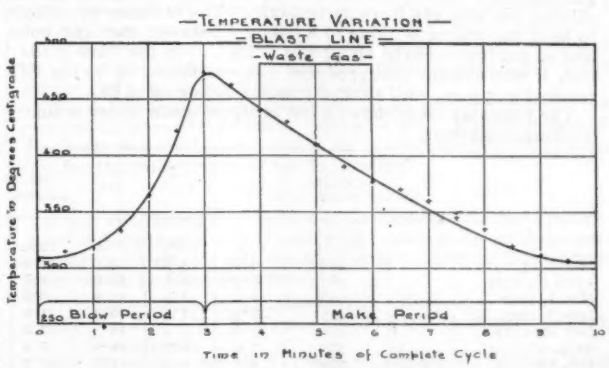


Fig. 6.

On a test made during the summer months of last year with two beds working with automatic control, the following results were obtained:

Gas made per ton of coal . . . . . 40,849 c.ft. (corrected).
Average calorific value of gas (7 tests). . 425·5 B.Th.U. gross.
Gas made in therms per ton. . . . . 174 therms.

Heat Balance (Calculated on 24 Hours' Working).

	Therms.	Therms.
Coal. 6·3 tons at 13,500 B.Th.U. per lb. . .		1905·12
Gas. 257,347 c.ft. at 425·5 B.Th.U. . . .	1095	
Coke in clinker (picked out) 11·54 cwt. carbon at 14,650 B.Th.U. per lb.	181	
Tar. 75·6 gallons at 15,800 B.Th.U. per lb. .	134	
	1410	
or 224 therms per ton	=	74·02 p.ct. efficiency.

Allowing for steam and electricity for blowing, net efficiency becomes . . . . . 62·5 p.ct.

Waste Gases.

	P.Ct.
CO_2	16·3
O_2	1·95
CO	trace.

Combustion chambers. (1) 1100° C. (2) 1220° C.
Waste gas temperature. 309° C. at commencement of blow.
475° C. ,, end ,, ,,
Average boiler pressure . . . . . 97 lbs. per sq. in.
The lowest calorific value was 421, and the highest 432 B.Th.U. gross.

The above tests gave a richer gas than is usually obtained when working to a balance between the coal charged into the retort and the coke used in the generator. When the coke produced is used up in water gas making, so that there is neither coke to add nor coke to be removed, a gas of about 380 B.Th.U. is obtained. To produce a gas of lower quality, part coke is used until, with no coal, blue water gas is obtained. Qualities over 400 B.Th.U. mean coke to spare from the generator.

At the Settle Gas-Works the Manager is using a single set with six retorts and automatic control. The setting is so regulated that 25 to 30 p.ct. of the coke produced in the retorts is drawn on to the floor. With one bed of mixed gas plant and one single bed of ordinary retorts, he is able to maintain the calorific value well over 520 B.Th.U., though handicapped by inadequate storage capacity.

The highest efficiency is obtained when working to a lower grade gas of about 350 B.Th.U., allowing a small quantity of producer gas to go forward by reducing the seal and keeping the generator full by pushing the charges out to suit. How far this can be done depends on the total make of the works and the extent to which dilution can be carried out. In a medium-sized works this can be done, but in a small works of (say) 30 or 40 millions, it is better to sacrifice a little efficiency and work to a higher standard—in other words, make a little less water gas.

The settings can be arranged for a higher quality by having some of the retorts in the arch as ordinary retorts. In single sets they would be stopped, and in larger sets continued through the generator. The bottom tier would be the most suitable for this purpose.

As an illustration of the higher heat efficiency on gas of lower quality, an earlier test gave the following results:

Gas made per ton of coal . . . . . 70,684 c.ft.
Average calorific value (nine tests) . . 279 B.Th.U. per c.ft.
Gas made in therms per ton . . . . 197 therms.

Heat Balance.

	Therms.	Therms.
Coal at 13,500 B.Th.U. per lb.		2298
Gas at 279 B.Th.U.	1498	
Coke in clinker (picked out)	342	
Tar	176	
	2016	(265 per ton)
	=	87·7 p.ct.

Deducting steam for generator and electricity for blowing, net efficiency . . . . . 75·2 p.ct.

The net efficiency when making 425 B.Th.U. gas is thus 62·5 p.ct., compared with 75·2 p.ct. when making 279 B.Th.U. gas. In the test above, the object was to determine the highest output of gas and the efficiency obtained when making a low-grade gas for diluting the rich gas from horizontals. The ordinary practice is to keep the setting working to a balance between coal and coke, and so produce a gas of about 380 B.Th.U. In the "low-grade" test, it was evident that producer gas was drawn in as the CO_2 reached 9·05 p.ct., with a corresponding falling-off in CO.

The following table shows a few analyses made under ordinary working conditions.

Date.	Calorific Value.	CO_2.	O_2.	CO.	Illuminants.
	B.Th.U. (Gross).	P.Ct.	P.Ct.	P.Ct.	P.Ct.
March 19, 1923 . . .	409	7·6	1·5	24·9	1·0
April 17, 1923 . . .	389	7·9	1·5	22·0	1·8
May 1, 1923 . . .	423	6·8	1·5	23·9	0·9
June 8, 1923 . . .	425	6·3	1·3	26·3	1·9
July 10, 1923 . . .	378	7·0	1·3	19·3	2·0
Sept. 21, 1923 . . .	373	7·9	0·7	21·0	1·4
Jan. 18, 1924 . . .	364	5·4	1·3	17·0	1·3
Jan. 23, 1924 . . .	364	8·0	1·2	18·1	2·1

In the ordinary way the gas from this plant passes into the existing foul main with the straight coal gas, but at Harrogate there is a separate battery of four settings. Arrangements have been made to pass the gas from this battery through a separate condenser and meter, before entering the foul main. There will thus be an opportunity of ascertaining daily what the plant is doing.

Some types of complete gasification plant in use require selected hard coals or a mixture of coal and coke in order to provide a satisfactory fuel for water gas making in the generator. In the plant here described, any caking coal with a reasonable amount of ash can be carbonized, especially slacks. A good coke is made in the retorts before being pushed into the generator for making water gas. It must be obvious that a short, full, vertical retort of a length of 6 ft. or so cannot make a suitable coke with the charge constantly moving, when a continuous vertical retort has to be about 25 ft. long to do this. With a short retort, the coal must therefore be only in a semi-carbonized state when it enters the generator—a most unsuitable condition for making water gas. It is found that the best results are obtained when the combustion chamber is from 1150° to 1250° C. or even higher, so that the hydrocarbons from the coal gas are fixed. At lower temperatures these hydrocarbons condense out as thin tar, and the efficiency is lowered.

The chief points making for heat economy in this plant are the following:

(1) A good carbonizing temperature is obtained entirely from blow gases, which are wasted in the ordinary water gas plants unless additional apparatus is used—*e.g.*, a waste-heat boiler.
(2) The sensible heat of the hot water gas is used for direct carbonization inside the retort.
(3) The quenching of coke and subsequent heating up are avoided.
(4) The heating of secondary air by waste gases.

Working Costs.

The following shows the comparative cost of production in our case between complete gasification and straight coal gas in horizontals, taking 10,000 therms of gas as a basis:

COMPLETE GASIFICATION—

		£ s. d.
Coal	$\frac{10,000}{187}$ = 53½ tons at 27s. =	72 4 6
Carbonizing wages . .	10,000 therms at 0·194d. =	8 1 8
Repairs and renewals .	10,000 ,, at 0·11d. =	4 11 8
		£84 17 10

Less residuals—

	£ s. d.	
Tar . . .	53½ tons × 12 gallons = 3½ tons at 45s. =	7 17 6
Liquor . .	53½ tons × 28 gallons = 7 tons at 3s. =	1 1 0
		8 18 6
Net cost for 10,000 therms . .		£75 19 4

= 1·82d. a therm.

HORIZONTALS—

		£ s. d.
Coal	$\frac{10,000}{65}$ = 154 tons at 27s. =	207 18 0
Carbonizing wages . .	10,000 at 0·4d. =	16 13 4
Repairs and renewals .	10,000 at 0·21d. =	8 15 0
		£233 6 4

Less residuals—

		£ s. d.
Coke . . .	77 tons at 30s. =	105 10 0
Tar . . .	154 tons × 10 gallons = 7¾ tons at 45s. . =	17 8 9
Liquor . .	154 tons × 28 gallons = 20 tons at 3s. . =	3 0 0
		£125 18 9
Net cost for 10,000 therms . .		£107 7 7

= 2·58d. a therm.

Carbonizing wages include all labour on coal handling, charging, clinkering, coke handling, &c., on both plants, but not boiler men, exhaust men, and supervision, which are common to the two systems. Repairs include everything on the plant in each case, and also re-setting.

Comparison of Costs with Horizontals.

A word of warning should be given with regard to the use of water gas plants of any description in very small works (less than 20 million c.ft. a year). In such works a manager cannot give the requisite attention to a water gas plant, owing to his many and varied duties; neither can the stokers be constantly breaking off their work to change the valves and control the quality of gas. The result is that the latter is very variable, or a man must be detailed to watch the plant, with the result that working costs are increased and the benefit of the plant is lost. The trouble is not so great with automatic control of the blow and run, giving constant quality; but even here, the proportion of water gas to coal gas is so great as to cause difficulties in working unless there is ample holder storage for mixing the gases. Matters may proceed fairly smoothly while the manager is on duty; but even he

must be allowed to go to sleep and have a holiday at times, and the plant is then left to the tender mercies of a stoker or labourer. It is surely a mistake for very small works to touch a water gas plant at all.

As to how far one should dilute with water gas depends on local circumstances. The author is of opinion, however, that in these days when constant calorific value, composition, and specific gravity of gas are required, a water gas plant should not be looked upon as an emergency plant. A works making 30 p.ct. of water gas one time and 5 p.ct. another cannot be giving a satisfactory supply. Too often it is assumed that a regular calorific value is sufficient, while the composition and specific gravity are allowed to take care of themselves.

In the author's works there are horizontal, vertical, and complete gasification installations, and it has been a rule that the proportions of the respective gases produced should be kept as constant as circumstances will allow, with a view to maintaining constant composition.

When installing a single unit of water gas plant for connection direct to the foul main without the use of a relief holder, due account should be taken of the rush of gas during the early part of the run, and the sudden drop in gas making when the blow comes on. In some cases where purifiers are small it would be better to put down two smaller units with the timing so arranged that the two sets are not blowing at the same time. Three or four sets, properly timed, and working automatically, give a very steady output, and very little variation of the vacuum in the foul main.

The use of a steam-engine for working the automatic gear may be questioned by some. A gas-engine, water-motor, or electric motor can be used, or the mechanism can be worked from an existing shaft, as is done at Settle. The small steam-engine with a reliable governor has the advantage that it is a slow-running machine whose speed can be varied at will. A small gas-engine or electric motor would require a very large reduction to get down to 6 revs. per hour. The power required to drive the line shaft is very small—¼ H P. being ample.

The cost of a setting is slightly less than a regenerator setting occupying the same space. In 1920, a horizontal setting of eight through retorts, complete with regenerators and ironwork, cost us £2330, producing 546 therms a day, equal to £4·26 a therm. The cost of a setting of eight through retorts, complete with blower and all ironwork, and occupying a similar arch and built at that time, would have been £2100, with a production of 720 therms per day—equal to £2·92 a therm.

There are a few points to which attention should be drawn before concluding—viz, the whole cost of installing this system is a revenue charge, as it merely displaces an existing setting, no alteration to existing mains on the retort bench is required, the existing mouthpieces, ascension pipes, and hydraulic main are utilized, and no new building is needed. Further, as the coal is pushed straight from the retorts into the generator, labour in handling coke is reduced to the minimum, and, as shown by the results, heat is saved.

The Contractors for the plant are Messrs. Drakes Ltd., of Halifax.

Cross-Head for Water-Gas Sets.

In a recent issue of "Tenny Service," Mr. R. S. Carter, Superintendent of the Malden and Melrose Gas Light Company, describes a new cross-head installed to make the operation of a water-gas set safer. Some time ago, the upper hot valve attached to one of the automatically controlled water-gas machines at Malden accidentally dropped down while the set was making gas. The trouble occurred just when the position of the valves was being reversed, and when the disc dropped it left both hot valves closed with the steam on the generator. An awkward situation confronted the operator for the time being. After shutting off the oil, the pressure in the carburettor and superheater was relieved through the stack valve, the steam turned off the generator, and the accumulated pressure released by loosening the coal-hole lid. Fortunately no damage was done. The accident was caused by the thread on the valve stem stripping and pulling out of the cross-head. To guard against the possibility of a recurrence of such an experience, a new cross-head was installed, using a hexagon nut, which is screwed on the valve stem. Then after the stem is screwed up into the proper position in the cross, the nut is tightened-up against the base of the cross, acting as a lock or jamb nut.

Technical Classes in Birmingham.—The gas technical evening classes at the Birmingham Municipal Technical School, which for many years have been an established educational feature, were started this week, with a larger attendance of students than formerly. The subjects of the curriculum are substantially the same as in previous years, but a re-arrangement of the courses has been made, in view of the fact that the examinations will take place in future under the scheme of the Institution of Gas Engineers. Hitherto the examinations were on the lines of those prescribed by the City and Guilds. The course will extend over five years, and instruction in actual gas supply or engineering will be given in the third and fifth years; the students being engaged in the first, second, and fourth years upon ancillary subjects leading up to the different grades.

INSTITUTION OF PUBLIC LIGHTING ENGINEERS AND SUPERINTENDENTS.

First Annual Conference in Glasgow.

The First General Meeting and Conference of the Institution of Public Lighting Engineers and Superintendents was opened in Glasgow on Tuesday, the 16th inst., and was continued on Wednesday at the same place—the Royal Technical College, George Street. Thursday was spent in visiting Edinburgh. All through the conference, the need for the new Institution was strongly emphasized, but at the closing session more than one speaker stressed a note of regret that the gas side of engineering and superintendence had been kept rather in the background. The electrical note, it was felt, had been predominant, and the hope was freely expressed that at future meetings the Council would strive to hold the balance equally between gas and electricity. Speaking for the Council, the President conceded the reasonableness of the point which had been urged, and indicated that an effort would be made to ensure there was no ground for complaint at future meetings. The fact that the electrical side of the industry had bulked largely in the papers and discussions was purely accidental, and need not be accepted as any criterion of the lines upon which the Institution would proceed.

The conference opened on Tuesday morning. Mr. S. B. Langlands, of Glasgow—the Lighting Superintendent for that city, and the first President of the Institution—occupied the chair. He was supported by Bailie George Kerr, Senior Magistrate (who deputized for Lord Provost Montgomery); Bailie Mitchell, Convener, and Bailie Fletcher, Sub-Convener, of the Watching and Lighting Committee of the City of Glasgow; and Mr. W. J. Liberty, Hon. Secretary. Members and representatives were present from principal cities and towns in England and Scotland.

A Civic Welcome.

Bailie KERR welcomed the members, and trusted the conference would be fruitful, and that everyone would learn something as the outcome. It so happened that he was not a member of the Watching and Lighting Committee of Glasgow, and so was not as intimately acquainted with the details of the work in regard to illumination as his colleagues, Bailies Mitchell and Fletcher; but he knew sufficient to permit him to say how fortunate Glasgow was in having Mr. S. B. Langlands, their President, as Chief of the Lighting Department. Mr. Langlands had proved himself a thoroughly competent Lighting Superintendent, and the members would have reason to appreciate his skill and ingenuity during their visit to the city.

Bailie MITCHELL spoke on the need of such an Institution as theirs, and alluded to the gratification which he personally felt because of the fact that the Glasgow Lighting Superintendent had been chosen as first President. It was an honour of which the city was proud.

Bailie FLETCHER said in 1765 there were only a few oil lamps in Glasgow; to-day they would see in the city every possible type of illuminant except an oil lamp. The first Gas Company was floated in Glasgow in 1815; the capital of £40,000 being found by members of the Corporation and private individuals. Two years later there were some 1472 street lamps, and that year the whole revenue of the city was only £15,111. Such a paltry sum to-day would not go far in the Lighting Department itself, to say nothing at all about the other branches of the Corporation. A further milestone was reached in 1890, when the Corporation obtained an Electric Lighting Order. From that date the really scientific lighting of the streets became a practicable proposition, because it was only after the introduction of electric light that gas engineers began to develop fully their side of illumination.

The PRESIDENT briefly acknowledged the courteous remarks of Bailies Kerr, Mitchell, and Fletcher, and in the name of the Institution thanked them for their presence and the cordiality of the civic welcome.

Membership.

The HON. SECRETARY reported that since the last meeting the membership had increased by the following accessions: Full members, 13; associate members, 12; delegates (comprising chairmen, vice-chairmen, conveners or vice-conveners, aldermen and councillors of various municipalities), 12. The Council had agreed to recommend that Mr. C. Chambers Smith should be elected the first honorary member of the Institution in recognition of the services he had rendered at the inception.

The PRESIDENT felt the members would cordially endorse the recommendation of the Council regarding Mr. C. Chambers Smith. The letter that gentleman wrote to the Press really laid the foundation for the inauguration of the Institution.

New Office-Bearers.

It was announced that there was no necessity for the appointment of Scrutineers, as the nominations received for office-bearers corresponded exactly with the number of vacancies. The various posts would be filled as under—

President.—Mr. S. B. Langlands, J.P., Glasgow.

Vice-President.—Mr. R. Mason, Public Lighting Superintendent, Birmingham.

Hon. Secretary.—Mr. W. J. Liberty, Corporation of the City of London.

Hon. Treasurer.—Mr. E. M. Severn, South Metropolitan Gas Company.

Hon. Editor.—Mr. E. J. Stewart, M.A., B.Sc., Glasgow.

Members of Council.—Messrs. R. Davison, Newcastle; T. Wilkie, Leicester; R. Beveridge, Edinburgh; E. F. Spurrell, London; W. H. Chapman, London; J. F. Colquhoun, Sheffield; Isaac H. Massey, Oldham; C. S. Shapley, Leeds; and H. Dodimead, London.

The PRESIDENT said he would have preferred to leave the chair at the present stage, but it had been represented to him by the Council that he should carry on until the next annual meeting, when the new President would take over the duties. If the arrangement was to prove helpful to the Institution, he would gladly acquiesce in it.

Mr. S. B. LANGLANDS then delivered the following

PRESIDENTIAL ADDRESS.

My opening sentence is of necessity one of satisfaction that our Institution is quietly but surely taking its place of usefulness. We are having the whole-hearted support of many of the public authorities, doubtless because they recognize that the communities they represent will gain materially from our labours.

My next note must be one of gratitude to my fellow-members for honouring me in electing me first President of an Institution which has so great a field for real public service in the years to come.

At the inaugural meeting my remarks naturally were on the need for an Institution such as ours, and the scope of its work and aims. It has been difficult to decide on a subject for to-day; but after pondering over the matter, I came to the conclusion that a useful subject would be "What Glasgow Corporation Lighting Department are doing," briefly dealing with our work as a public service. We do not claim that Glasgow is the brightest city in the Kingdom, but we do claim that throughout the miles and miles of streets we have more adequate general illumination than is usually found in our large cities.

The policing and lighting of Glasgow are carried out under the direction or care of the Watching and Lighting Committee of the Corporation. Watching and lighting make a happy—in fact an inseparable—combination. The work of the Lighting Department comes under the special care, in the first instance, of a Sub-Committee of seventeen members drawn from the parent Committee; the Chairman of the Sub-Committee being, as a rule, the Chairman of the bigger Committee. Our meetings are held fortnightly, and the Town Clerk and the Inspector of Lighting are in attendance at all meetings. All the accounts of the Department are submitted, as also all lighting proposals and suggestions, and reports and every extraordinary matter which arises in connection with public lighting.

The work of the Department is carried out under the terms of the Glasgow Police Act, 1866, amended in minor details by various subsequent Corporation Acts, and radically changed in the Glasgow Corporation Order, Confirmation Act, 1914. Prior to the passing of this Act of 1914, the lighting of private (or unadopted) streets, courts, and common stairs was a charge against the proprietor, with, in the case of common stairs, a relief against the tenants or occupiers. Now all public lighting, including these, is carried out by the city, and charged to General Assessment, levied in this case half on owner, and half on occupier. This means a big saving of time and trouble, and I should perhaps add, temper, because it was often very difficult to get consents from proprietors of properties to carry out sometimes very extensive work, more especially where the properties were yielding little or no return to the owners. The owners were undoubtedly carrying a responsibility which in community administration was never really their own, but most assuredly a communal burden, for these private streets, courts, and common stairs are open and accessible, and can be used by any of the citizens. The total cost of the public lighting of Glasgow last year was £289,004. This means that we are levying this year an assessment of 7·02d. per £, half payable by owners, half by occupiers. Under the terms of the 1914 Act we must for all our work keep within the figure of 9d. per £. You will see that we have still a margin to come and go on, but not a very big one; and this explains why we have no brilliant display lighting.

Glasgow has an area of 19,183 acres, but for our purposes it will be better to put it that there are over 500 miles of streets and well over 20,000 closes and stairs lit each night.

For the lighting of the streets we use:

Electricity	1066 Flame-arc lamps.			
	1005 Gasfilled lamps.			
	1543 Metal-filament lamps.			
Gas	5 High-power low-pressure lamps.			
	115 4-light burners, 6·75 c.ft.			
	1,397 2-	,,	,,	3·5 ,,
	20,711 1-	,,	,,	2·8 ,,
	2,898 1-	,,	,,	1·25 ,,

For the lighting of our closes and stairs we use:

Electricity—4289 20-watt metal-filament lamps, with special switching device.

Gas—81,624 Glasgow burners—·7 for 500 B.Th.U. gas.

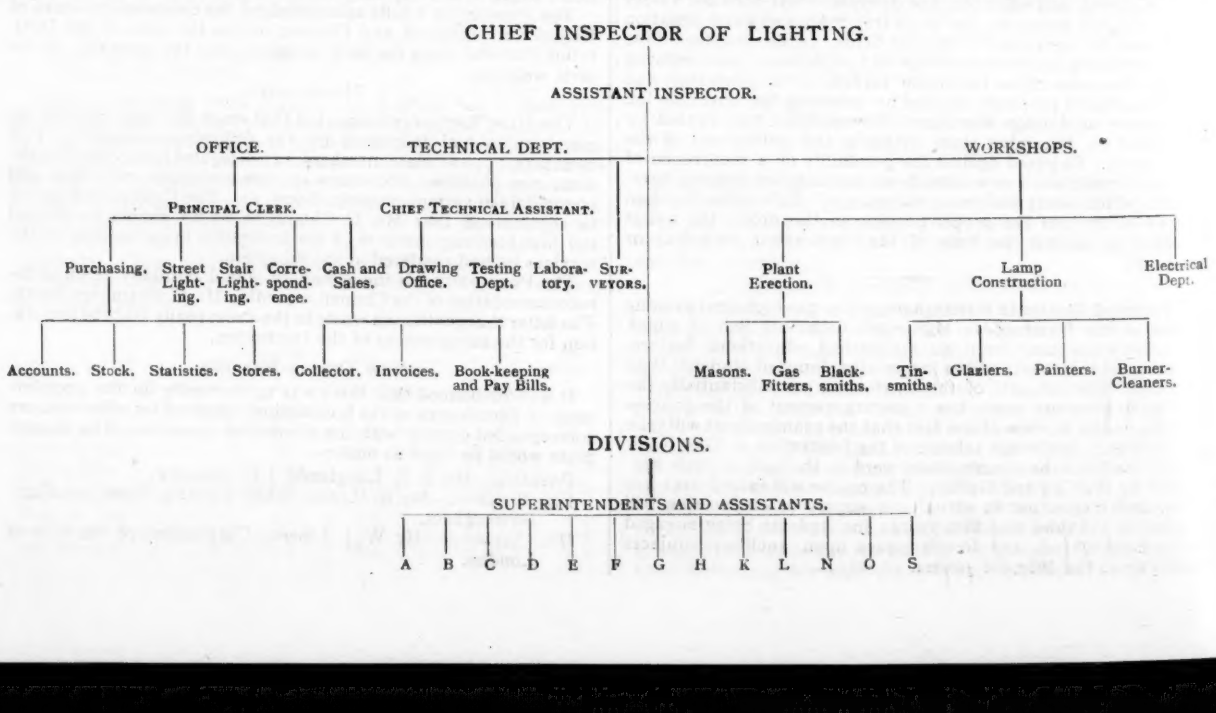
Our main thoroughfares, which are for the most part car routes, are lit by 8 or 10 amp. flame-arc lamps, spaced 100 yards apart on either side of the street, or 50 yards apart staggered, on a line taken along the centre of the street; or with gasfilled lamps of from 100 to 500 watts consumpt, at the same spacing; or with 4-burner incandescent gas lamps, with a special size of mantle, slightly smaller than the No. 2, at 46 yards spacing, or 23 yards staggered; or with 2-burner incandescent gas lamps, with a mantle larger than the No. 2. Our other streets and courts are lit with single incandescent gas burners, with a mantle 30 mm. deep. Prior to the alteration in the thermal value of the gas, the mantle was over 40 mm. deep.

We are aiming on our busiest thoroughfares to have a maximum of about 5 foot-candles and a minimum of 0·1 foot-candle, or a mean effective value of somewhere about 2 foot-candles. On streets with less traffic we can be less ambitious.

In our stair-lighting we try to maintain a light value of about 20 candles at every lighting point. In the entry and on every landing there is a light; and if the stair is badly constructed and dark, the number of lights is increased to meet the needs. We have standardized our electrical fittings and apparatus, having special Glasgow patterns, and we have also standardized our gas burner in Glasgow for stair-lighting purposes.

We are charged almost 1½d. per unit for electricity, and 2s. per 1000 c.ft. for gas. For street lighting the quantity of electricity taken per annum from the Electricity Department is 3,380,026 units, and 256,000,000 c.ft. of gas is taken from the Gas Department. For stair-lighting we use 320,767 units of electricity and 228,812,000 c.ft. of gas. The total quantity of gas sold to us is greater than the whole make of gas for one year in many of our larger cities.

Bothwell Street and Elmbank Street have just been selected for our latest experiment with controlled high-power low-pressure gas lamps. To gain preliminary data, three lamps of the type to be used were erected in a street in proximity to a railway station, a very busy short thoroughfare. You may think we hasten too slowly, but my retort would be that we hope to go surely. One of our great advantages in Glasgow is that we are not tied down to any special class of lighting, electricity or gas. (This is the benefit of having public lighting as a dissociated department.) Our aim is to get the best value for our money in cost per unit



or cost per therm, always remembering that in addition to these first costs there is the ultimate cost of handling to be reckoned with.

There are altogether about 1200 employees in the Department, and for street and stair lighting the city is divided into 13 divisions, with a superintendent and deputy in each. The divisions have from 50 to 100 men and women as street and stair lamplighters in attendance. Twelve surveyors are employed going over the whole city examining and reporting on all the street and stair beats, and these surveyors report through the Chief Surveyor directly to the Inspector of Lighting, and the superintendents are dealt with by the Chief where defective lighting prevails. Every division is connected directly by telephone to the Head Office, there being a private branch exchange at No. 20, Trongate, with 43 lines, and an operator is in constant attendance. All stores are sent to the divisions from headquarters on the receipt of requisitions. Only minimum stocks are allowed to be carried in the districts.

Each lamplighter—street and stair—lights, extinguishes, cleans, and maintains about 120 lamps, and is held entirely responsible for his, or her, beat. On electric stair beats the number of lights under the worker's control is increased, as the switching is done at the stair-foot, there being 4 or 5 lamps on each switch. We are at present planning to increase the number of electric lamps per switch, and thus save labour charges. My colleague, Mr. Mitchell, will, however, go more fully into this question in his paper, as he knows my wishes and is trying his utmost to meet them.

I have spoken of the divisional offices; let me now deal with our Head Office, and perhaps the best way would be to show our staffing graphically (see diagram). The office work is obvious in its lay-out. The scope of our other sections should, I think, be dealt with in greater detail.

STORES.

So big a field as the City of Glasgow necessitates the carrying of a large stock of lighting material, and effective and efficient store-keeping is therefore a very necessary adjunct to our working. Everything coming into the Department passes through the store, and samples are taken from the deliveries for test in our laboratory. As a rule we carry sufficient mantles to meet the demands of the city for a period of three months; and the same can be said of pillars and brackets, glassware, glazing material, wrought-iron gas-fittings, burners, cabling, electric bulbs, &c. Such things as uniform clothing are also handled in the store. Our commercial motor vehicle is used for the transport of material from the stores to the district offices.

LAMP MAKING.

We have a fully equipped lamp-making workshop, and the practice for many years has been to manufacture all our own street lanterns and carry out all the repairs to them. In this workshop there is a superintendent and an assistant superintendent, 17 tinsmiths, 10 labourers, 1 glazier, 2 painters, and 6 burner repairers. A paper could be written on the equipment of this workshop alone. Suffice it to say that all the latest tools are supplied to the workers, gas and electricity being brought into use for the bolt-heating and drilling, and even our painting is done by a spraying plant electrically operated. During the war period these workshops were turned into aeroplane-part making depôts, and we carried out £32,000 worth of work, mostly on the construction of aeroplane petrol and oil tanks and special fittings for the aeroplane stays. We also did copper-smithing work on the exhaust pipes for the engines. It was a splendid training for our men, as we had to work in most instances with an accuracy which required correctness to 1/2000th part of an inch.

LAMP ERECTING.

A superintendent and assistant and 30 employees are engaged solely on lamp-erecting and repairs to plant on the streets. The tradesmen in this division are either masons or gas-fitters, with their requisite complement of labourers. All lighting plant after being made ready in the workshops is conveyed by our own commercial motor vehicle to the site of erection. Many urgent calls are made on this department during both night and day to deal with plant smashed on the street by traffic, as a rule by fast-going traffic. The heavier work of erecting high standards necessitates the use of a travelling crane. The crane we have in use has a lifting capacity of 2 tons.

ELECTRICAL DEPARTMENT.

We have an Electrical Department which deals solely with that side of our work, and a staff is kept here also in constant attendance not only for the doing of new work, but for emergency calls. There has recently been purchased a tower ladder, which extends to 30 ft., to permit of attention being given to our highly placed large power electric units.

JOINERS' WORKSHOP.

Several joiners are also employed making all the wooden material required in connection with lighting plant, such as ladders, torch poles, boards and straps for stair lanterns, &c., and in addition this staff carries out any repairs or alterations required to improve or bring up-to-date our premises.

LABORATORIES AND DRAWING OFFICES.

In concluding this discussion of the work, I want to take our laboratories and drawing offices last, not because they are least important, but because they are a new equipment of lighting stations. Some years ago, when the laboratory was first instituted, our research work on burners permitted of a saving of about £30,000 per annum in gas consumption. At that time a very complete and elaborate series of tests was made on the behaviour of incandescent gas burners, and an effective burner was built-up which consumed fully 1 c.ft. less than the burners previously used, with a higher candle-power efficiency; and this was how our first big saving was made. All mantles are tested for light yield, durability, and shape, and nothing is purchased which does not meet our standard requirements. The same holds good with regard to glassware. Electric bulbs and every new lantern or lamp submitted are tested in our laboratories. We do not hesitate to give the result of those tests to the suppliers of material, so that every person gets fair play, and no favour is shown to any contractor. Our goods are purchased on their true worth. Here again, I hope in the years to come that a full description of our laboratory work and the researches that we have made will be given to our Association. I am merely in this address giving you an indication of the scope of our work. In our drawing offices we have Ordnance Survey plans of the whole city which we light, and these are kept up-to-date. Every new design of lamp is carefully thought out, and then given to the draughtsman to elaborate in detail. Plans coming from other departments are carefully filed; and because of our fairly perfect laboratory and drawing office equipment, we are given internal as well as external illuminating engineering work for other departments of the Corporation.

I think you will agree with me that we are fairly well equipped, though not over-equipped.

The future holds more and more intricate work for public lighting authorities. The trend towards control of street traffic means work for us; and our ideal should be to have our streets so lighted at night that all vehicles can be seen and their drivers see without dependence on the lights carried by the vehicles.

Though this is a somewhat long story, you will see that I have given you nothing but bare facts, in the hope that these will be useful to my brother lighting engineers. If you have problems which you have difficulty in solving and we have the equipment to solve them for you, let us have them. We gain experience from having knowledge of your worries.

I should like to express my gratitude to the members of my staff who have wrought hard to make this meeting in Glasgow a success.

READING OF PAPERS.

The reading of papers was next proceeded with, but notice of these is held over.

THE LUNCHEON.

On Tuesday afternoon the members of the Institution were entertained to luncheon in the City Chambers, Glasgow. Lord Provost Montgomery presided, and he was supported by the Corporation officials and the office bearers of the Institution.

The toast of "The Institution of Public Lighting Engineers and Superintendents" was given from the chair, and the Lord Provost hinted that for the sake of convenience and euphony, the officers of the Institution might consider the expediency of shortening their title-name. There was no doubt that great progress had been made in street lighting in the City of Glasgow. Of course they did not claim to be perfect in that respect. There was still much to be done. In particular he had the feeling that a great many of the poles and standards could be dispensed with, especially in the streets along which there were tramway standards.

The PRESIDENT, with whose name the sentiment was coupled, remarked that their Institution was made up of craftsmen. The need for such a Society had long been felt, and he was bound to admit that the forenoon session that day had been most inspiring and refreshing.

Councillor W. E. HENCKS, of Leicester, proposed the toast of "The Lord Provost and Corporation;" and a brief acknowledgment was made by Lord Provost MONTGOMERY.

STREET LIGHTING IN GLASGOW.

Tuesday's programme closed with a tour of inspection of the street lighting in Glasgow. The itinerary covered was a comprehensive one, and embraced the districts of Cowcaddens, Maryhill, Kirklee, Great Western Road, Bridgeton, Pollokshaws, and the housing schemes at Coplawhill and Mosspark. From the routes travelled it was noticed that the usual arrangement of lighting units in Glasgow is by pillars at the kerb, staggered. All flame-arcs and some fittings for 500-watt gasfilled lamps are equipped with raising and lowering gear. Other units with high mounting are maintained by use of motor tower wagons. All flame-arcs and some 300-watt and 500-watt gasfilled lamps are run in series, usually ten across 500 volts. Other electric lamps are run in parallel, on a 250-volt circuit. The gasfilled lamps are all on pillars. Generally, the width of the street is 60 ft.

Wednesday's Proceedings.

Proceedings were resumed on Wednesday forenoon in the Royal Technical College, Glasgow, when the attendance was again large and representative.

The PRESIDENT at the outset alluded to the tour of inspection of Glasgow's street lighting which had been made on Tuesday evening. He had no doubt they had all seen sufficient of the lighting of Glasgow to enable them to appreciate what was being done. On Tuesday evening they did not cover more than fifteen miles; and when he told them that the Glasgow Corporation had

500 miles of streets and roads under their jurisdiction, it would give them some idea of the magnitude of the city's lighting.

A GRACIOUS ACT.

The PRESIDENT announced for the information of the members that during the morning the Council had placed a wreath on the cenotaph at George Square, Glasgow. To his mind this was a very gracious act, and it was one which had been prompted by the southern members.

A TIMELY SUGGESTION.

Councillor MELLIOR, Sheffield, said he did not know whether it was opportune to interpose a remark at this point in regard to the future policy of the Association. He hoped, for instance, some effort would be made to deal with street lighting from the standpoint of the gas engineer as well as from the electrical side. In Sheffield they were particularly interested in the illumination of streets by gas, and naturally enough they were desirous of knowing everything they could of progress in this direction. It would be for the future good of the Institution if the Council saw to it that the gas side of lighting was not neglected.

The PRESIDENT said he could give an undertaking that the gas lighting side of the profession would be as fully dealt with as the electrical. A combination of circumstances had caused the electrical side to be strongly stressed on this occasion, but what had happened need not be taken as a precedent.

SAFETY FIRST COUNCIL.

The PRESIDENT reminded the members that the Safety First Council was now in session, and that an invitation had come from various quarters that the Institution of Public Lighting Engineers and Superintendents should be represented on that body. The suggestion he would make was that Mr. W. J. Liberty should represent the Institution at the meetings of that very useful body.

The suggestion was agreed to.

Thursday's Proceedings.

Thursday was spent in a visit to Edinburgh; and in the early afternoon the members of the Institution were entertained to luncheon in the Caledonian Station Hotel. Lord Provost Sir William L. Sleigh presided, and he was accompanied by Lady Sleigh and Miss Sleigh. Besides the leading officials in the employment of the Corporation of Edinburgh, there was also in attendance a large representation of the members of the Cleansing and Lighting Committee.

In proposing the toasts of "Our Guests," the Lord Provost remarked that the Corporation of Edinburgh were glad to have an opportunity of welcoming the members of the Institution to the capital of Scotland. Since the Institution was barely a year old, it could be described as a lusty youngster full of vigour and promise. He felt certain that ample scope would be found for its activities, not only in large cities but in urban centres. That afternoon the visitors were to have an opportunity of inspecting the methods of lighting in Edinburgh; and he believed they would be unanimously of opinion that the system in vogue there could not be improved upon. [Laughter.] All of them he supposed were ready to recognize that the question of street lighting was one of vital importance in these days, from the points of transport, traffic control, and safety. He was impressed with the need for the Institution, and so he cordially wished it every success in the furtherance of its objects.

Mr. S. B. Langlands, the President, with whose name the sentiment was coupled, said the feeling between Glasgow and Edinburgh was perhaps better than it had ever been hitherto. All of them were looking forward to the inauguration of the great new road which would make the link between the two cities indissoluble. Speaking for the Institution, he had to confess that those who were foremost in working for its formation had conceived and fostered big ideals. They felt, for instance, that lighting was one of the biggest essentials of city government, and that without good lighting they could not have efficient watching or satisfactory control of traffic.

Bailie Fletcher, Glasgow, proposed the health of Edinburgh's Lord Provost, which was heartily toasted.

The remainder of the day was spent in driving round the city and its environs, where places of historic and romantic interest were visited. In Gillsland Road the visitors had an opportunity of seeing the latest pattern of Edinburgh lamps. By way of Davidson's Mains the party reached the Granton Gas Works soon after four o'clock. Here a long halt was called, to enable the visitors to inspect the plant and works. During an appropriate interval in the proceedings, tea was served. At a later stage a further tour of inspection was made of the city's streets. Features that gave rise to comment were the new suspension lamps in Seafield Road; the lamp at Carlton Brae fitted with superheated burners and pyramided to light either one or three burners; Waterloo Place with its high-pressure gas lamps; Princes Street equipped with holophane fittings for lighting; and the tramway island lamps in the same broad expanse of street with their effective transparencies.

It only remains to add that the conference was a complete success; and for the smooth carrying-out of details praise is due to the members of the Council and to the Hon. Secretary, Mr. W. J. Liberty.

THE SCIENTIFIC PROMOTION OF GAS SALES.*

A NEW volume on this subject, written by Mr. Arthur Coe and published by Messrs. Ernest Benn, Limited, is indicative of the modern trend of thought regarding gas service; and its advent will be welcomed throughout the gas industry as marking a distinct phase in the industry's development.

The book is divided into two sections; the first relating to a detailed account of the organization of a distribution department, the second containing a fund of useful information regarding the use of gas for heating and cooking, which will be of great interest and benefit to all gas salesmen. Part I. commences with a general introduction dealing briefly but efficiently with the question of coal conservation and the manner in which this important duty to the nation can best be accomplished, and a short survey of the first principles underlying gas-works administration. In this introduction it is pointed out that economy in gas production, and economy in the use of gas, which is a moral obligation arising from the first, constitute the economic responsibilities of the gas industry. The fundamental of satisfactory gas service, says the author, is the maintenance of a constant supply of gas of a uniform specific gravity and calorific value, to be available at pressures that have been proved by experience to be requisite for the achievement of the best service to the consumer. This, of course, is by no means a new thought, and for years those responsible for the control of gas undertakings have realized that this is at the root of the matter. Unfortunately, however, appreciation of this obvious necessity has not always resulted in adequate action; and while all gas concerns readily admit the desirability of this ideal, many have as yet done but little to make it an accomplished standard. Perhaps this book by Mr. Coe will remove some of the difficulties which appear to have such threatening shape, and which in this direction separate desire from attainment.

With regard to the actual substance of the first section, it is not possible in a short review to say a great deal. It is concerned with material and labour control, the co ordination of sales, the control of repair shops, division of distribution expenditure, the job voucher system, administrative records, the indirect expenses of distribution, the allocation of oncosts, and cost allocation and terminal accounts. The information in this section cannot be regarded as a universally applicable formula calculated to remedy all ills and cope with all situations, for every undertaking has its own particular set of conditions which can only be met by particular treatment; but it will certainly be of real practical value as a guide to and a basis for a system of scientific distribution administration applicable to all gas undertakings, whatever their size.

The second section contains a great deal about heating and ventilation, treating the subject from the early history of appliances, through their development, to the modern apparatus which meets the requirements of present-day knowledge of hygiene and comfort. Considerable space is devoted to the determination of the radiant efficiencies of various types of fires using different fuels, and the evolution of the "Leeds" radiant efficiency test is described at length. It is disappointing to find, however, that in this section—as, indeed, throughout the entire volume—no attention is paid to electricity. The salesman is in need of reliable information regarding both gas and electricity, for without it he will find that in his dealings with the general public he will either have to shelve some of his difficulties or put forward arguments so unconvincing as to be actually harmful to the cause of gas. This section also deals admirably with the use of gas for cooking, but the water-heating load is summarily dismissed in a few pages which leave one little the better for having read them.

It is difficult to understand why gas lighting is not mentioned at all. In a work of this nature one would naturally expect to find some reference to such an important and virile branch of gas usage; and the fact that no reason is given by the author for its omission makes it all the more surprising. Though, therefore, Part II. of the book contains much of value, the criticism might be urged that the material has not been selected with the best judgment, having in view the space available.

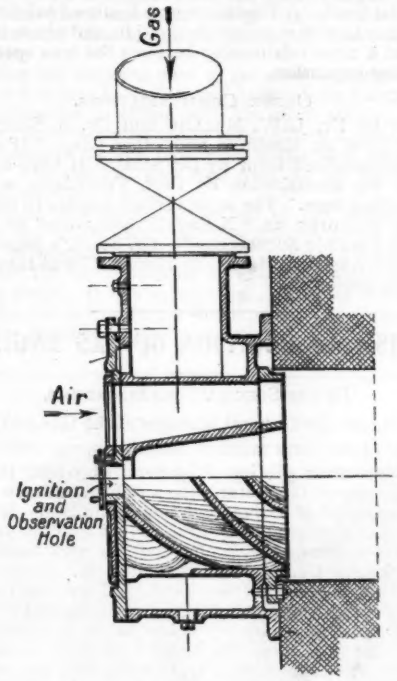
The ten pages devoted to salesmanship and publicity enterprise contain a great deal of common-sense. The book concludes with three appendixes. The first is an extract from an address by Dr. Leonard Hill, delivered in 1912 before the Physiological Section of the British Association; Appendix 2 gives the standard instructions to be followed in drawing up specifications for the piping of houses not exceeding six rooms; and the third appendix is the specification for the standard gas cooker of the National Gas Council.

* "The Scientific Promotion of Gas Sales," by Arthur Coe (Consultant in Technical Gas-Works Administration). Published by Messrs. Ernest Benn, Limited. Price 42s. net.

Eastern Counties Gas Managers' Association.—The half-yearly meeting of the Association will be held in the Essex Reception Room, Abercorn Rooms, Liverpool Street Hotel, London, E.C., on Wednesday, Oct. 8. The retiring President, Mr. E. F. Keable, of Gorleston, will take the chair at 2.30 p.m. After the induction of President for 1924-5 (Mr. F. A. West, of Newark), Mr. R. A. Weston, of Norwich, will read a paper on "Gas Purification." A discussion will follow on "Gas Distribution in the Future," to be opened by the President. Tea will be served in the lounge at the close of the meeting.

THE PATENT PLUTO GAS BURNER.

The Pluto Stoker Company, No. 2, Upper Westbourne Terrace, London, W. 2, are responsible for a gas-burner for coke-oven, blast-furnace, and producer gas; and the design is of such interest that we propose to give a brief description of the apparatus.



The Pluto Burner.

The burner is shown in section in the illustration, from which the general construction will be readily visualized. It consists of air and gas chambers divided by radial partitions, so that between every two air chambers there is one gas chamber. The gas enters through a connecting branch into the circular gas chamber. From this main chamber it enters into a number of smaller ones, and the exit part of these is shaped like a nozzle and has the form of screw blades. The gas supply to the main chamber can be regulated by a damper. The air enters the burner through openings in a covering lid. The size of these openings depends on the type of gas which has to be burnt, and the air supply can be adjusted by a disc, the construction of which also depends on the sort of gas. The gas and air, on leaving the burner, are divided in small streams, alternately gas and air; and by the special shape of the partitions between the chambers, these streams get a circular rotating movement, thus giving a very good mixing of gas and air, and combustion with short flames. This results in a high temperature in the combustion chamber, with a consequent high steam-production efficiency. As the burner has no rotating parts, wear and tear is slight; besides this, dirt deposits cause practically no trouble. The burner is easy to clean, for the door can be opened without dismantling the gas connecting branches and piping.

The following are the results of a recent test on a Pluto gas burner fitted to a Lancashire boiler without superheater:

Date of test	Nov. 20, 1923.
Duration of test	7 hours.
Heating surface of boiler	1156 sq. ft.
Temperature of feed water	44·6° Fahr.
Total amount of water evaporated	44,000 lbs.
Steam gauge pressure above atmospheric	85·1 lbs. per sq. in.
Pressure of gas in gas piping	0 76 in. W.G.
Draught in furnace	0·52 in. W.G.
Temperature of gas	69 8° Fahr.
Lower heating value of gas as determined with Jünkers calorimeter	4630 B.Th.U.
Heating value of gas (calculated) as supplied to burner	4399 B.Th.U.
Quantity of gas burnt per hour	20,780 c.ft.
Temperature in furnace	2060° Fahr.
Temperature at end of inner flues	866° Fahr.
Temperature at boiler damper	511° Fahr., right, left.
P.Ct. of CO_2 in flue gases at end of inner flue	10 0, 9·7.
P.Ct. of O_2 in flue gases at end of inner flue	1·4, 1·3.
Total amount of water evaporated from and at 212° Fahr.	54,000 lbs.
Evaporation from and at 212° Fahr. per hour and sq. ft. of boiler heating surface	6·68 lbs.
Evaporation from and at 212° Fahr. per 1000 c.ft. of gas	366 lbs.
Total efficiency of boiler	82·3 p.ct.

Sir George Thomas Beilby, F.R.S., LL.D., D.Sc., who died on Aug. 1, aged 73, left estate of the gross value of £163,689. with net personalty £154 248.

REFRACTORY MATERIALS SECTION OF THE CERAMIC SOCIETY.

Meeting at Wembley.

The Fourteenth Meeting of the Refractory Materials Section of the Ceramic Society was held at the British Empire Exhibition on the 18th and 19th inst.—Mr. J. HOLLAND presiding.

COMPARISON OF GAS AND COKE FIRED DRYING STOVES.

Mr. T. W. BARLEY, in a paper on this subject, made reference mainly to experiences in the Imperial Steel Works of Messrs. Edgar Allen & Co., Ltd., of Sheffield, but possible applications go much further than drying moulds and cores at a steel works. These moulds and cores were formerly dried on bogies in brick chambers provided with fire-boxes at the end farthest from the door. Coke was used as fuel, and the method was very unsatisfactory, not only because of the large quantity of coke used, but also because some moulds were spoiled by overheating and others were not dried sufficiently for use again. A drying stove of only 710 c.ft. capacity required 17 cwt. of coke in fourteen hours. It was decided to construct a number of drying chambers to be operated by Sheffield town gas (then 10d. per 1000 c.ft. for gas of about 560 B.Th.U). This actually reduced the cost of drying—owing to economizing space, simplified construction, absence of chimneys, elimination of carting (fuel and ashes), and reduction of number of operators—at first, but war conditions soon altered that, and though the gas-fired drying stoves did their work well, eventually the drying problem called for close attention.

Careful investigations showed the importance of regulating the gas pressure, the great advantage of an insulating lining (Moler bricks) to the stove, ventilation of the drying chamber, and the employment of special burners (replacing the old bunsen burners) with a view to improving the distribution of the heat. Along these lines considerable advances were made. Much condensation (causing rust) took place within the drying stove at all temperatures up to boiling point. It was recognized that the ideal drying stove would have as the drying medium hot gases, or air as dry as practicable, and a temperature as nearly constant as possible. Employment of hot air for drying is precluded because of the expense.

Following experimental trials with a furnace imported from Germany, a modified form of the furnace is attached to one or more drying chambers. The furnace is of brick, and is mostly sunk into the ground. The hot gases from the fire are caused to pass upwards along each side of firebrick louvres, between which they are met by a pre-heated compressed air jet at 80 lbs. pressure per sq. in., the products of combustion being thus projected at a high velocity into the drying chamber. Advantages of this type of furnace used in conjunction with the drying chambers are economy of fuel consumption, little attention required, easy regulation of temperature (within limits) by turning on more or less air, economy of space, with low cost both for construction and maintenance, and no chimney required. The furnace may be placed some distance from the drying chamber without much loss of heat. As a guide to the operator, a satisfactory thermographical chart may be closely copied. The cheapest available fuel above the grade of dust may be used, complete combustion is attained, and ordinarily unskilled labour may be employed to operate the installation, with the help of the thermograph chart.

These furnaces have given very satisfactory results for the past ten months. The apparatus is so efficient that all the moulds are thoroughly dried at the end of the run (of fifteen hours), no moulds being burned or imperfectly dried. The average working temperature employed for mould drying ranges from 225° C. down to 180° C., according to size. Many interesting details are given in the paper.

SOME PROPERTIES OF CLAY-SILLIMANITE MIXTURES.

A paper on this subject, submitted by Prof. J. W. COBB, C.B.E., B.Sc., F.I.C., and Mr. H. S. HOULDSWORTH, M.Sc., which was read by Mr. Dale, stated that the natural commercial sillimanite used contained 32·9 p.ct. of silica, and 64 p.ct. of alumina with oxide of iron and titanium oxide; the grading being 11·8 p.ct. between 5 and 10 mesh, 6·2 p.ct. between 10 and 20 mesh, 17·5 p.ct. between 20 and 30 mesh, 21·4 p.ct. between 30 and 50 mesh, 25·1 p.ct. of six grades between 50 and 200 mesh, and 18 p.ct. between 200 and 250 mesh. Test pieces used contained 0, 20, 33⅓, 50, and 66⅔ p.ct. respectively of sillimanite, the remainder being Farnley fireclay. Other test pieces contained 95 and 90 p.ct. of sillimanite with 5 and 10 p.ct. respectively of ball clay. The fireclay and ball clay were ground to pass a 20 mesh sieve. The specimens were fired in a works kiln to Cone 06 in 48 hours and to Cone 9 in 72 hours, some of the latter test-pieces being subsequently burned for 2 hours at Cone 14 and Cone 18 respectively in a laboratory gas-fired furnace—3 hours being taken to attain the temperature. The drying and firing shrinkages, porosity, true and apparent specific gravities, refractoriness, reversible thermal expansion, and resistance to solution by a soda-lime glass and a basic slag were determined.

The results obtained show that increased percentage of sillimanite produces decreased drying shrinkage and decreased firing shrinkage. The addition of sillimanite to the fireclay produces a more open structure in the body at the higher temperature of burning. The presence of 50 p.ct. or more sillimanite leads to a

decided increase in the refractoriness of the body. A mixture of 95 sillimanite with 5 ball clay has a regular coefficient of expansion from 15° to 1000° C., which is not affected appreciably by differences in the firing temperature up to Cone 18. The rapid expansions shown by fireclays from 100° to 200° C. and from 500° to 600° C. are reduced by the addition of sillimanite. The expansion of a typical fireclay from 600° to 1000° C. is less than that of sillimanite in the same range. Sillimanite bonded with 10 p.ct. of ball clay shows a marked resistance to chemical attack by soda lime glasses and basic slag. Mixtures of sillimanite and clay containing less than 50 p.ct. of sillimanite are not appreciably more resistant to such attack than is fireclay alone.

Mr. S. A. GREEN (speaking on behalf of Mr. W. Emery) mentioned that saggars containing a high percentage of sillimanite were still in good condition after being in use for a year. Firebricks of similar composition have been successfully used.

INFLUENCE OF EXPOSURE ON THE CHEMICAL AND PHYSICAL PROPERTIES OF CERTAIN FIRECLAYS.

Mr. W. HUGILL, M.Met., next read a paper by himself and Mr. W. J. REES, B.Sc.Tech., F.I.C., which stated that experiments were carried out to investigate the nature of the changes occurring in fireclays exposed for a fixed period. The samples tested were: (1) A light grey, somewhat sandy, micaceous clay from Durham, (2) a dark-coloured, compact, fine-grained clay from the Sheffield district, and (3) a light grey, very sandy and micaceous clay from another locality. The samples were exposed for twelve months, spread evenly over the bottoms of wooden boxes. The meteorological conditions were recorded, and analyses were made of the three clays in the unexposed and exposed states. Small bricks were made of each material, unexposed and exposed. The conclusions drawn from the results of tests are that exposure to the weather removes impurities in the clay to a variable extent, depending on their chemical and physical characteristics. It improves the working properties of clays 1 and 3 (which are silicious), but in the case of the more aluminous clay 2, though some impurities are removed, the general properties, and in particular the workability, are not materially improved by exposure. Bacteria seem to play an important part in the decomposition of sulphides present in clays, and possibly such decomposition may be accelerated by inoculation.

ACTION OF HEAT ON KAOLINITE AND ON KAOLINITIC CLAYS.

A paper by Prof. W. VERNADSKY (read by Mr. Dale) was a controversial contribution, bearing on the phenomena noted on heating kaolinite and clays; and as it is mainly of interest from a theoretical standpoint, details are scarcely called for here.

ALUMINA-SILICA MINERALS IN FIREBRICKS.

Mr. REES contributed a paper which was also largely of theoretical interest, though some of the results seem to indicate advantages derived by firing firebricks at very high temperatures.

STORAGE OF SILICA REFRACTORIES.

This was the next subject dealt with by Mr. REES.

It has been noticed that silica bricks and blocks which have been stored without adequate protection from weather influences have spalled badly in use, while normal freshly-delivered bricks of the same make and having the same texture, specific gravity, &c., were satisfactory. In one case the good bricks had a cold crushing strength of 3000 lbs. per sq. in., as against only 2200 lbs. for the stored bricks. Tests were made with silica bricks, some fresh, and others after full exposure to the weather during four months. Results give definite indications that the loss in strength of silica bricks exposed to weather is in part due to a slight degradation of the bond by hydration and solution in water, as well as to the physical effect of frequent wetting and drying. These tests showed little or no distinction in the behaviour of the coarse and fine textured briquettes, but in both cases the briquettes burned at higher temperatures were more resistant to water.

A RAPID METHOD FOR THE DETERMINATION OF TRUE SPECIFIC GRAVITY.

Mr. REES read a paper by himself and Mr. HUGILL on this subject. The method depends on the use of a flask with a long neck, and a bulb near the lower end of the neck. Close to the bottom of the neck is the 250 c.c. mark, and the neck above the bulb is graduated in specific gravities from 2·00 to 2·70; the specific gravity being read off without calculation. Liquid is poured into the flask up to the 250 c.c. mark, and then exactly 100 grammes of dry powdered brick is gradually dropped into the flask. After standing for 2 minutes, to let air bubbles escape, the level of the liquid is read on the graduated neck of the flask. By using the hydrocarbon xylene as the liquid (instead of water or alcohol), accuracy to within 1 in the second place of decimals is obtainable, the powder being fine enough to pass through a 30-mesh sieve.

THE TRUE SPECIFIC GRAVITY AND AFTER-EXPANSION OF LIME-BONDED SILICA BRICKS.

A further paper by Mr. REES stated that a series of forty bricks from North and South Wales, the Sheffield district, North of England, Scotland, and France were tested. The following points were noted: (1) For bricks of lime content between 1 and 3 p.ct. there is a sufficiently close relation for practical purposes between the true specific gravity (or powder density) and the degree or extent of quartz conversion. (2) For bricks of fine and medium texture there is a close relation between the true specific gravity and the after-expansion as determined by the standard after-expansion test. For works purposes, a rapid determination of the powder density of such bricks gives a definite indication of the permanent volume change which is likely to occur during their use. (3) That for the raw materials which are in use in this country for the making of lime-bonded silica bricks, the grading of the raw material has in general a greater influence on the rate of quartz conversion than variations in the source or type of the raw material itself. (4) That for coarse-textured bricks containing large fragments of raw materials (*i.e.*, ¼ in. and above in diameter) there is not a close relationship between the true specific gravity and the after-expansion.

OTHER COMMUNICATIONS.

A paper by Dr. J. W. MELLOR and Dr. A. SCOTT on "The Action of Heat on Kaolinite and other Clays" (Part II.) was given in summarized form by Dr. Scott. It bore on the same subject as the contribution by Prof. Vernadsky, and scarcely needs reporting here. The same remark applies to the paper by Dr. ASSAR HADDING on "X-Ray Investigations of Clays and some other Ceramic Substances." Dr. SCOTT'S paper on "The Origin of the Austrian Magnesite Deposits" was taken as read, being purely geological.

SWEDISH ASSOCIATION OF GAS ENGINEERS.

By our SPECIAL CORRESPONDENT.

Mr. Dahlander, the General Manager of the Gas and Electricity Department of the Corporation of Stockholm, was President of the Swedish Association of Gas Engineers, who held their annual meeting this year at the picturesque and historic town of Kalmar, opposite the island of Oöland, on the Baltic Sea. He has been President since the formation of the Association ten years ago.

On Sunday evening, Aug. 30, he, together with several officials of the Stockholm Corporation, including Mr. Blomquist (Chief Engineer of the Gas Department) and Mr. Danielsen (head of the Distribution Department) left Stockholm by the night train. Mr. Walter Dunn (the Secretary of the Institution of Gas Engineers), on holiday bent in Scandinavia, had the felicity of being included in this company—thanks, we hear, to the kindly consideration of Mr. Dahlander, who, with his usual goodness, placed at the British Secretary's disposal, a lower sleeping berth in his own compartment. Arrived at Kalmar at about 10.30 on Sunday morning, they found other members of the Association assembled at the railway station to greet them, including Mr. Jacobson, who is the Engineer and General Manager of the Kalmar Corporation Gas and Electricity Works. After arranging for hotels, a bee-line was made for the steamer for the passage across the channel to the island. During this voyage, a substantial breakfast was taken in true Swedish fashion. For beverage lager was offered—not tea or coffee, which came later on at the close of the repast.

On disembarking, motor cars were found waiting for a delightful tour through some of the most interesting parts of this somewhat barren island. We were taken to an ancient compound, where ages ago assembled the chieftains and their followers, who engaged in mortal combat with flint-headed spears, &c., as weapons. On to the famous old castle of Borgholms, we were wheeled. Here half-an-hour was occupied in the examination of the ruins. The castle was built in the year 1654, and was destroyed by fire in 1806. It was at one time the residence of the old Kings of Sweden. Now it serves but to attract the attention of the tourist and the archæologist. A few miles away may be seen the modern and far less pretentious residence of the present King and Queen of Sweden. Here, during the summer months, the Queen resides, and derives much benefit from the restorative properties of the atmosphere. Her Majesty is not robust.

The photograph reproduced was taken during the morning's motor tour. It depicts Mr. Jacobson standing on the footboard, Mr. Dahlander standing next to him; Mr. P. Larfen, Secretary of the Danish Gas Association and Engineer of the Gas-Works at Aabenraa, which before the war was in German territory, and is now in Denmark; and Mr. Hans Sahlberg, Engineer of the Gas-Works at Helsingfors, Finland.

The members then walked through a wooded plantation to the Mat Sedel restaurant at Borgholms, where lunch was in readiness for them. Mr. Dahlander was in the chair, and Mr. Blomquist in the vice-chair. The visitors included Mr. Dunn, a representative of the Danish Association of Gas Engineers, and a gentleman from far-away Finland. Post-prandial speeches during coffee were commendably brief. The President welcomed Mr. Dunn as representing the British Institution of Gas Engineers. They were delighted to have this gentleman from England with them, and appreciated the circumstance that, instead of going to Gottenberg, as he had originally intended, he had joined the Association at their Kalmar meeting. Mr. Dunn, in a brief acknowledgment, assured the members that he had been deeply gratified by the really royal welcome extended to him on this his first visit to Sweden. It was, of course, an indication of the estimation which Swedish gas engineers entertained for their progenitor the Institution of Gas Engineers, founded in the year 1863.

The steamer was again requisitioned, and the party were shortly afterwards facing the elements during the trip round the south of the island, back to the port of Kalmar.

In the evening they were the guests of Mr. Jacobson at the

offices of the gas and electricity undertaking, where an elegantly served dinner was greatly enjoyed. After this festivity, coffee was offered in an adjoining room, to the accompaniment of Mr. Jacobson's wireless installation, which he himself skilfully manipulated. He also played the violin, accompanied by Mr. Dunn, who, in turn, contributed a humorous song—a long way after Corney Grain. This effort, however, so pleased his new Swedish friends that they there and then elected him to honorary membership of the Association's Musical Union. It was a delightful evening in every way.

Next morning the business part of the meeting commenced at 10 o'clock. It was held in the Council Room of the Kalmar Town Hall—Mr. Dahlander presiding with his usual ability. After a few formal words of welcome to the visitors from abroad, he presented the accounts for the past year, which were regarded as satisfactory. The roll call was read over by the Secretary by towns, not by members' names.

Mr. Blomquist was elected President of the Association in succession to Mr. Dahlander. He duly acknowledged the compliment, and proceeded to read a letter of thanks addressed to Mr. Dahlander for his invaluable services as President for the period of ten years. It was agreed that the Rules of the Association be adjusted to enable Mr. Dahlander to be elected as the first Honorary Member of the Association.

With the Swedish Gas Association—Sept. 1.

Various reports of the visits of members to England for the Wembley Exhibition and to Germany for the purpose of obtaining special information as to the use of gas in hotels and restaurants were presented and discussed. A comprehensive paper on "Gas Prices," by Mr. H. M. Mölin, of Malmo, was then given; and an animated discussion followed which lasted till lunch time, and was then adjourned till the afternoon.

It was at the close of luncheon that Mr. Dunn bade an affectionate farewell to the members of the Association and hurried off for the 2.30 p.m. train from Kalmar for Copenhagen, the next country of his holiday pilgrimage being Denmark.

On the Association reassembling the discussion on Mr. Mölin's paper was resumed and concluded; and a paper by Mr. Jacobson followed on the subject of the "Development of the Use of Gas for Baking Purposes." It was well illustrated by an actual specimen of a very ingenious burner which has been adopted in Kalmar, and which is giving satisfactory results.

In the evening another state dinner was greatly enjoyed, which brought the proceedings of the meeting to a conclusion. The singing of "For he's a jolly good fellow"—a melody taught the previous evening by the newly-elected Honorary Member of the Musical Union—formed a special and amusing feature of the accompanying ceremonials.

Gas at the British Empire Exhibition.—At Wembley gas is used in a great number of the exhibits. Take the Palace of Industry, for example. Here gas is being used in nearly thirty of the exhibits. Similarly in the other palaces, pavilions, and kiosks, gas is rendering its quiet, sometimes unseen, but never-failing service. The two miles of streets in the Amusements Park, where 96 p.ct. of the visitors are to be found at night time, are beautifully and brilliantly lighted by gas lamps. Again, the cooking and water-heating operations in the fifty large restaurants of Messrs. J. Lyons & Co., are done entirely by gas. Already over 10,000,000 meals have been served. These striking facts, together with many others, can be gleaned from the current issue (No. 127) of "A Thousand and One Uses for Gas" which contains many illustrations of the various exhibits whose requirements necessitated the laying of 13 miles of mains. Copies of this interesting publication can be obtained free of charge on application to the Secretary, The British Commercial Gas Association, No. 28, Grosvenor Gardens, S.W. 1.

BRITISH EMPIRE EXHIBITION NOTES.

The Vickers Research Laboratory.

The research section of Vickers' Exhibit at Wembley consists of a laboratory in which are shown some of the scientific apparatus and methods employed in Vickers' factories. The scientific work required by such an industrial organization is of two kinds—on the one hand, the control of materials, processes, and products; and on the other, research properly so-called. Research again naturally divides itself into two categories—that which is directed towards a goal predetermined by the exigencies of production, such as an improved process or a new material, and that which aims, irrespective of questions of utility, at elucidating any obscure phenomena. The most successful investigators, whether industrial or academic, are unanimous in declaring that research, and especially the type of research last described, cannot be omitted from the activities of a scientific worker without detriment to the quality of his output. It is a pabulum which plays a part in his mental growth not unlike that of the vitamines in his bodily growth. For this reason, though the laboratory attached to each factory has control as its most insistent responsibility, yet research is always being carried on. In particular, the Sheffield Works, dealing as they do on a vast scale with such a basic product as steel, are provided with a Metallurgical Research Department consisting of a suite of laboratories fully equipped to carry out investigations into all the complex phenomena—thermal, constitutional, magnetic, &c.—which are encountered in the manufacture of metals in general, but of steel in particular. To the Central Research Laboratory at Dartford it falls to deal with new queries and problems which may arise anywhere in the organization. Finally, the important research laboratories and information bureau of the Metropolitan-Vickers Electrical Company, Ltd., is a great self-contained scientific organization in itself, capable of dealing with all questions affecting the development of electric construction. That all these scientific activities might be portrayed as fully as possible, the well-known methods and apparatus of the ordinary chemical laboratory have been excluded; and the space has been utilized in a broad manner. Though all the exhibits are of very great interest, it is impossible to describe them all here, and we shall have to content ourselves with a brief account of one or two of particular interest.

The "Fusion" Rotary Retort.

There is a small-scale "Fusion" rotary retort, illustrating the low-temperature carbonizing plant designed and manufactured by the Fusion Corporation, Limited. It comprises a rotary retort into which the material to be treated is introduced at slightly above atmospheric temperature, and is gradually heated as it travels forward with uniform speed and thickness. In most cases oil commences to come off at slightly above 200° C., and continues to be given off up to temperatures between 400° and 600° C.

The whole plant consists of a gas producer, a retort tube rotating in a heating chamber, and oil condensers and washers. Producer gas is used for heating the retort. The heating gas enters the chamber through a number of ports which can be so regulated that the temperature at any part of the retort may be controlled. The heating gases are admitted into the heating chamber at the discharge end of the retort, and leave at the feed end. By this arrangement the counter-flow system is obtained. The combustion chamber and the heating chamber are of brick, and the parts subject to higher temperatures are lined with firebrick. The mass of brickwork assures uniform heat.

The retort is horizontal, and is fitted with breakers or pulverizers. The function of the latter is to prevent scaling on the walls of the retort, to avoid the caking or "balling" of the material, and to break up the material during treatment. These breakers are not separately or positively driven, but are placed loosely in the retort. As this revolves it takes the breaker round with it until the latter arrives at a point where it overbalances. The material then falls over on to another point or arm of the breaker. This point does not come in contact with the metal of the retort, but falls on to a layer of the material being treated; and the result, in practice, is a gentle thud. Thus the retort, when working, is almost noiseless. In operation these breakers have a hammer action, not a scraping action.

The joint between the rotating retort and the stationary chamber is made air-tight by means of a gland. A thin iron diaphragm, rendered additionally flexible by circular corrugations, is attached to the stationary chamber and pressed by springs against the end of the rotating retort. A connection is mounted on the stationary chamber for the purpose of carrying off the gas and oil vapours. The latter go to the condensers, which may be of any approved type, and the gas may be utilized in the combustion chamber, if not wanted for other purposes. There are sight holes and examination doors in the walls of the chamber. The heating producer, if required, is of the simple type, so as to save the necessity for a boiler. Some of the spent material itself can be used as fuel in the producer, when coals or certain cannels or torbanite are being treated.

The plant, state the makers, is not expensive to instal, requires little power to operate, and is entirely self-acting. It is claimed that 1·5 H.P. is sufficient for driving the feed, the retort, and the discharge for a 5-ton unit.

The Abbe Refractometer.

In general the refractometer may with advantage replace the

hydrometer or specific gravity bottle when liquid products—such as those produced in the distillation of coal—have to be controlled. The refractive indices of liquids give valuable information concerning the purity of oils, the strength of aqueous solutions, &c.; and mixtures of two liquids are also readily analyzed by the use of the refractometer. Consequently the Abbe refractometer, manufactured by Messrs. Adam Hilger, Ltd., and shown in this exhibit, is of special interest. The liquid to be investigated is enclosed as a film between two prisms of dense flint glass. The upper prism has a polished face in contact with the liquid, and it is the ray which grazes this face that is utilized in making measurements. Each prism is enclosed in a hollow jacket through which water at constant temperature can be circulated. The use of daylight is made possible by employing a compensator to neutralize the dispersion of the liquid and thus give an achromatic field. The compensator consists of two direct-vision prisms, which are rotated at equal rates in opposite directions by turning a milled head, and together form a system of variable dispersion. The compensator is provided with a scale, readings on which give dispersions by reference to printed tables provided with the instrument. To make a measurement, a drop of the liquid to be investigated is introduced between the prisms. On looking through the eye-piece and moving the index, a dark shadow with a sharply defined edge comes into the field of view. This edge is brought on to the cross lines in the eye-piece, and the corresponding refractive index read-off on a divided scale.

Identification of Hydrocarbons.

One of the exhibits consists of an apparatus in the experimental stage for the identification of hydrocarbons in the vapour phase by means of absorption spectra in the ultra-violet. This apparatus, which was demonstrated to us, is of a simple nature, and illustrates a method as yet little employed in chemical laboratories. The hydrocarbon to be examined is first of all vaporized, and the vapour is then passed through an annular space formed by two concentric quartz tubes in which are two mercury vapour lamps. The spectrascope by which the hydrocarbon vapour is examined is set at right angles to the quartz tubes. The apparatus is at present in the experimental stage, but some of the results afforded hold out much promise of success.

The Nutting Colorimeter.

This instrument has been designed for the analysis and specification of colours—for instance, colour screens or light sources, &c.—and is very efficient for photometric work. Any colour may be analyzed and specified in either of two different ways: (1) In terms of three primary components, red, green, and blue (trichromatic analysis); or (2) in terms of wavelength of dominant hue or its complementary and the percentage of white (monochromatic analysis). Of the three elements of colour, hue and tone are determined with a colorimeter, luminosity with a photometer. In the present form of colorimeter the photometer is an integral part of the apparatus.

Colours to be analyzed consist of light either emitted from some source, transmitted through some selective screen, or reflected from some matt or semi-matt surface. Any one of these colours to be analyzed may be either spectral or purple, according to whether or not its dominant hue lies in the visible spectrum. Any analyzing colorimeter should then be applicable to emitted, transmitted, or reflected light of either spectral or purple dominant hue. The advantage of monochromatic analysis lies in the elimination of the arbitrary reference standards (red, green, and blue); readings being given in wavelength and p.ct. white. Both methods give readings varying somewhat with the observer, involving in some cases correction to the absolute colour scale based on the average properties of a number of normal eyes.

The Nutting colorimeter utilizes this method of monochromatic analysis. Colour measurement with this instrument is effected by mixing white light with light of a pure spectral hue. The hue and the proportion of white are varied until the mixture matches the colour to be analyzed. Finally the wavelength of the dominant hue and the percentage of white admixed are determined, and these two qualities (hue and purity) recorded as specifying the colour determined. This procedure suffices for analyzing all colours, except the purples. For these, light of a pure hue is mixed with light of the unknown colour in such a proportion that the mixture is pure white, and the specification of the colour follows in analogous manner. The instrument is made by Messrs. Adam Hilger, Limited, No. 75A, Camden Road, London, N.W. 1.

Experimental Heat Treatment.

Among other apparatus, furnaces for the experimental heat treatment of steels and for temperature control by pyrometric means are shown in operation; while in a specially designed electric furnace the hardening and tempering of small components is carried out in an atmosphere of unburnt coal gas.

Institution of Mining Engineers.—The thirty-fifth general meeting of the Institution will be held in Conference Hall No. 2, British Empire Exhibition, Wembley, on Thursday and Friday, Oct. 2 and 3. The retiring President, Sir John Cadman, K.C.M.G., will take the chair; and among the papers to be read we notice one by Prof. K. Neville Moss, M.Sc., on "The Physiological Standardization of the Kata-Thermometer;" one by J. T. Storrow and J. Ivon Graham, M.A., on "The Application of Gas Analysis to the Detection of Gob-fires," and one by F. S. Sinnatt, M.B.E., M.Sc., F.I.C. and H. E. Mitton, M.Inst.C.E., F.S.I., on "The Preparation of Coal for the Market."

TECHNICAL NOTES FROM THE SOCIÉTÉ TECHNIQUE MEETING.

[From "Le Génie Civil," July 26.]

(*Concluded from p.* 880.)

New Water Gas Generator.

This plant, which has been developed by the Compagnie Continentale des Compteurs in collaboration with MM. Heurtey and Sauvageon, was described by M. Réa. As will be seen from the drawing reproduced, a circular grate is fitted, which is turned by hand through gearing when clinkering is necessary.

The coke is introduced at the top of the vertical retort portion A, which is surrounded by a recuperator B, wherein the blow gases are burned by the admission of secondary air at E; the heat being returned to the steam from C during the run. Blowing takes place always in an upward direction—from H—but steaming is reversible; D being the bottom inlet for this purpose. The grate is on ball bearings, and clinkers may be loosened by pricking through doors provided [not shown in the drawing]. The blow gases are evacuated through K, and the water gas led off through I or J.

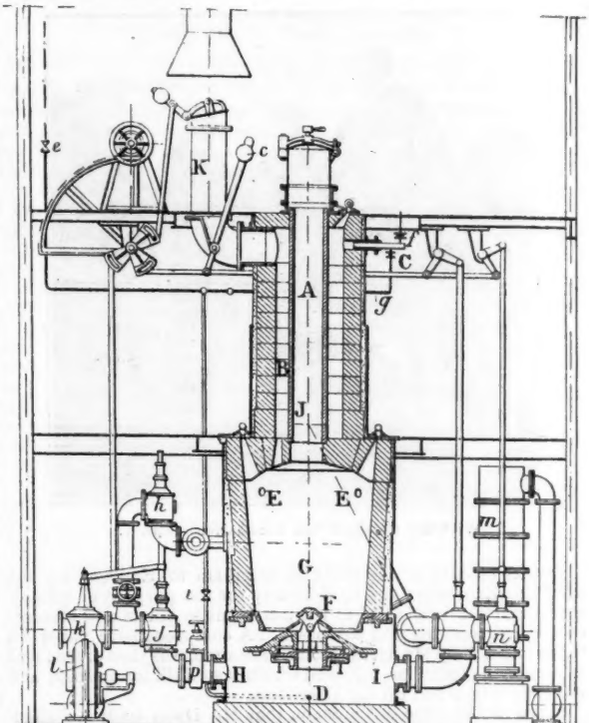


Fig. 1.—Vertical Section through Plant.

c, change-over lever; *e*, steam valve; *f*, oil valve; *g*, *i*, steam inlets; *h*, *j*, air valves (secondary and primary); *k*, safety air valve; *l*, blower; *m*, washer; *n*, gas valve.

M. Réa also described briefly a modification of this plant, in which steam was generated in a jacket surrounding the generator; but in the subsequent discussion M. Laurain gave as his opinion that such practice was heretical. Mr. Grebel, too, concurred. While it might be sound to recover in a boiler heat which otherwise would be lost, and logical to utilize the sensible heat of both blow gas and water gas for steam-raising, nevertheless it was distinctly bad practice to cool the zone of the endothermic water-gas reaction as several designers of plant wished to do. Coke in contact with the cold sides of the boiler would give low-temperature water gas ($CO_2 + 2H_2$), instead of the normal ($CO + H_2$)—working which was disastrous from every point of view.

Carbon Monoxide in Incandescent Lighting.

M. Chappuis dealt with this subject. The CO content of the gas, he said, plays a leading part in incandescent lighting, as upon this constituent depends air regulation, the size of mantle, the question of back-firing, and the luminous output of the mantle. From well-known formulæ M. Chappuis deduces that:

For a given gas, the volume passed by the injection of a bunsen burner is in inverse ratio to the square root of the density of the gas at the temperature of injection.

The rate of flow is independent of the density of the gas and its temperature; it depends simply upon the pressure and the size of nipple opening.

The mass of air entrained through the primary air inlet is a constant, whatever the gas and its temperature.

Having graduated the opening of the air inlet on an incandescent burner for ten or twelve positions (zero being complete closure), the author has observed that the luminous intensities for a given gas and mantle, when the opening is varied, can be represented by parabolas which become wider as the CO content of the gas is lowered. He has given the name "critical position" to the setting of the primary air inlet which corresponds to the intersection of two extreme parabolas—A, fig. 2. Such setting gives what might be termed an "omnibus" regulation, and means a loss of 7 p.ct. in the luminous intensity from what might be obtained with gas containing 16 p.ct. of CO, and 9·6 p.ct. in the case of a 10 p.ct. CO content.

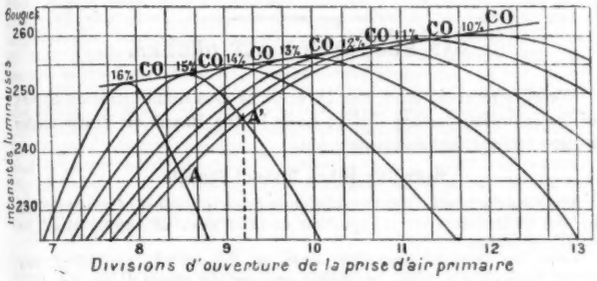


Fig. 2.—"Critical Positions" Varying with the CO Content.

In further experiments a ratchet arrangement was employed to vary the height of the mantle above the nozzle of a burner, and the influence of CO in this regard was studied. When the CO content is gradually increased, the height of the naked flame steadily diminishes, because, first, the density of the gas is increased so that the volume passed at a given pressure decreases; and secondly, the volume of air necessary for complete combustion diminishes as the CO increases. The second cause predominates, and one is led to make a reduction in the primary air. The following figures show, in the case of three different gases, the effect on the luminous output of varying the height of the mantle.

Height of Mantle. Cm.	Candles or CO Content of		
	9·6 P.Ct.	10·8 P.Ct.	14 P.Ct.
7	72·7	57	53·5
6	71·4	73	62
5·5	63·7	59	66·4
5	59·7	54	71
4·5	56·4	50·5	68

Burners supplied with gas of high CO content show a strong tendency to backfire, particularly in the case of inverted high-pressure burners in which the burner tubes are usually at a high temperature. This tendency, which is a serious drawback in practice, might be explained by the presence of an excess of CO; and as backfiring is actually due to the fact that the speed of propagation of the flame is higher than the speed of flow of the gas and primary air, M. Chappuis undertook research on the influence of CO on flame propagation at ordinary temperatures and the higher ones obtained in superheater lamps. He adopted the method of fusible marks spaced 0.5 m. apart in a cold tube, and then in a heated tube; the mixture of air and gas being prepared in a container supplied with a stirring device. Fig. 3 shows the results obtained at ordinary temperatures; and fig. 4 the high-temperature results.

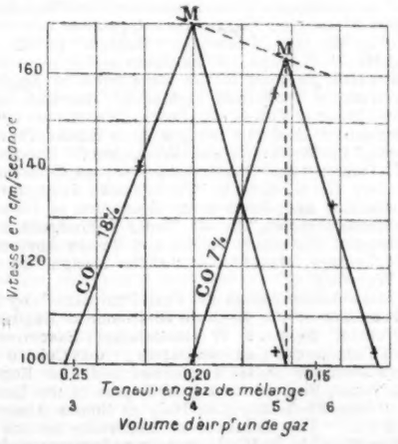


Fig. 3.—Influence of CO on Flame Propagation in a Cold Tube (18 mm. dia.).

The curve F_1 evidences what is known as slow combustion, formerly studied by Armand Gautier. At a temperature very much below that of the flame or explosion an auto-combustible

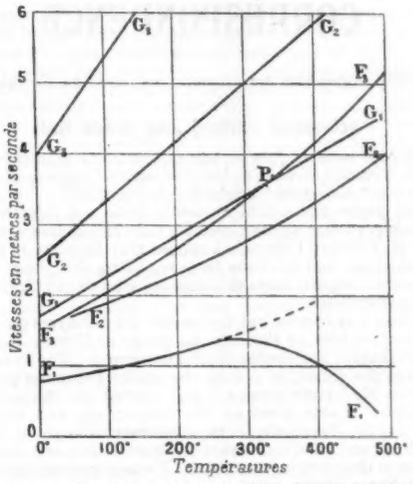


Fig. 4.—Influence of Temperature on (A) Flame Propagation (20 mm. tube) and (B) Flow from Nipple.

A { F_1: 1 vol. gas (7·1 p.ct. CO) and 9 vols. air.
F_2: 1 vol. gas (5·85 ,, ,,) and 5 vols. air.
F_3: 1 vol. gas (12·8 ,, ,,) and 5 vols. air.

B (1 vol. gas and 5 vols. air.) { G_1: 23 mm. tube.
G_2: 19 ,, ,,
G_3: 15 ,, ,,

mixture forms (up to certain limits which increase with the temperature) after a few seconds. At temperatures above 200° C., therefore, the gaseous mixture must be supplied at a rate sufficient to avoid this phenomenon.

For backfiring to take place, the speed of propagation of the flame must be greater than that of flow of the mixture. Auer lamps with 23 mm. burner tubes were subjected to experiment, and it was found that in normal working the injector temperature was 240° C. and the temperature near the burner-head 480° C. Normal working was attained at the end of 45 minutes. Backfiring took place most often, with a gas containing 13 to 15 p.ct. of CO, at the end of 30 to 35 minutes, when the burner-head temperature was just above 300° C. It suffices to examine curves F_3 and G_1 to understand that backfiring must inevitably take place under these conditions of time and temperature. Actually the curves G_1 and F_3 intersect at a point P, corresponding to a burner-head temperature of 340° C. Up to this point, the speed of flow of the gaseous mixture (G_1) is higher than that of the flame propagation (F_3), so that backfiring is impossible. Above this point, however, the smallest incident suffices to bring about backfiring. The temperature of 340° C. is generally attained at the end of about half-an-hour. The curves G_2 and F_3, on the other hand, only intersect between 600° and 700° C.; and the satisfying of such conditions as are represented by them would make backfiring practically impossible. The tubes and heads of burners should be designed after a consideration of these phenomena.

When water gas and coal gas are mixed, one could say that the hydrogen content hardly varies, but that a certain volume of CO is substituted for an equal volume of CH_4. The calorific power decreases, but the flame temperature is raised. The good effect of CO on the efficiency of incandescent lighting is easily explained, for the total radiant energy per unit time and unit surface of the radiating body is proportional to the fourth power of its absolute temperature.

In the discussion, M. Grebel remarked that various experiments showed that the mass of air entrained through the primary air inlet depended on the resistances of the diffuser and the burner head downstream. In particular, the heating of the gaseous mixture would always reduce the ratio of primary air entrained to gas, if the important effect of simple draught did not intervene—a point which one was entirely wrong to neglect. In his opinion, with reference to the third law enunciated by M. Chappuis early in his paper, one should speak of "equivalent orifice" instead of "primary air inlet." Pressure of time prevented M. Grebel from demonstrating that the phenomenon of backfiring was not as simple as elementary theory indicated. The speed of flow of gaseous mixtures in practice was much greater than that of flame propagation at working temperatures. Incomplete gas-air mixtures were not auto-combustible except at high pressures; and even then the flame speed was much below the maximum. Backfiring was a complex problem of the nature determined by M. Caussé. In M. Grebel's opinion, when the functioning of a burner was affected, it was not due to carbon monoxide, but to streaks of gas rich in hydrogen, which possessed a very high speed of flame propagation.

Curing Meat by Gas.—According to the New England Bureau of Public Service Information, old methods of curing meat and meat products by smoking have been superseded in Chicago by the use of gas for drying and smoking. To-day there are 334 manufacturers of food products using more than 1,000,000,000 c.ft. of gas per year. Meat to be smoked is first washed in brine, rinsed in clean water, and allowed to drain. It is then hung in the smoke house, which is usually built like an elevator shaft.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Activated Carbon and Silica Gel.

SIR,—In your issue of July 30 you published an extract from a paper read by M. Edouard Urbain at the Centenary Congress of the Société Technique, on "Activated Carbon and Silica Gel."

From this paper one would naturally draw the inference that the benzole recovery plant at the Grenoble Gas-Works was erected to the designs of M. Edouard Urbain. I should therefore like to prevent any misunderstanding, and state the facts regarding this plant, verified by two independent experts from this country who visited Grenoble to see the plant in operation.

The erection was carried out by the Société Anonyme pour l'Utilisation des Combustibles, of Paris, to the design of Messrs. Friedr. Bayer & Co., Leverkusen, and under their guarantees. The installation of steam coils in the filters, to reduce the steam consumption (specially mentioned in M. Urbain's paper), was carried out during the course of the erection of this plant on the instructions and to the design of Messrs. Friedr. Bayer after their experimental filters at Leverkusen had been fitted and tried out with these special coils and data obtained therefrom as to the resulting economy. These experiments were carried out at Leverkusen during 1923.

Further, since the plant has been put in operation, a pre-filter has been added in order to minimize the risk of fouling the highly active "T" carbon with foreign bodies which cannot be driven out by means of highly superheated steam, or only with great difficulty. This pre-filter is again to the Friedr. Bayer Company's design, and is filled with their pre-filter carbon. This would have been embodied in the original design for the Grenoble plant, but it was assumed that the gas would be clean enough to be dealt with directly in the benzole carbon filters.

In my paper read before the Chemical Engineering Group of the Society of Chemical Industry on March 7, the Grenoble plant was described, and a diagrammatic slide of the arrangement thereof shown. However, figures as to plant operation could not be given at that time, as it had only been in operation for some five to six weeks.

I feel it only right and fair to Messrs. Friedr. Bayer & Co. that I should draw your readers' attention to these facts, for though the Société Anonyme pour l'Utilisation des Combustibles have the sole exploitation of this Bayer process in France, my firm, Messrs. Simon-Carvés, Ltd., No. 20, Mount Street, Manchester, have its exploitation for the United Kingdom, and we work in the closest co-operation with Messrs. Friedr. Bayer & Co.; all information being pooled for our common use.

Owing to the French occupation of the Ruhr, there was difficulty in obtaining delivery of the active carbon from Messrs. Friedr. Bayer & Co.'s Leverkusen Works, and apparently one of the three filters at the Grenoble plant was filled with carbon manufactured according to M. Edouard Urbain's process.

The Grenoble plant is one of the many solvent extraction plants using the Bayer process and carbon, among which there are in operation and in course of construction plants extracting over 2000 tons of benzole per annum.

VIVIAN F. GLOAG.

Holmwood, Knutsford, Cheshire,
Sept. 19, 1924.

[We are indebted for this amplification of what was practically a verbatim translation of the latter part of M. Urbain's paper.—ED. G.J.]

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 17.]

Nos. 21,113 to 21,688.

BENJAMIN, A.—"Mechanical apparatus for controlling gas." No. 21,172.

BLAKEBEY, J. F.—"Apparatus for cleaning gas." No. 21,552.

BRISCOE, W.—"Gas-purifying apparatus." No. 21,661.

GLOVER, W. R., and GLOVER & CO., LTD., T.—"Apparatus for supplying motive power for opening, &c., valves, &c." No. 21,658.

ILLINGWORTH CARBONIZATION COMPANY, LTD., and ILLINGWORTH, S. R.—"Apparatus for drying, &c., coal, &c." No. 21,324.

KIRKE, P. ST. G.—"Exhausting-apparatus." No. 21,294.

SCHAFFER AND BUDENBERG GES.—"Cut-off valves, &c." No. 21,521.

TWEEDIE, J.—"Pipe joints, &c." No. 21,120.

Ideal Home Exhibition at Swansea.—The Swansea Gas Light Company are taking the opportunity presented by the Ideal Home Exhibition at present running in Swansea, to demonstrate to the public the necessity for gas in the ideal home. To-day there are gas appliances of such a character that most of the labour connected with cooking, ironing, and washing in the household is eliminated; and the Swansea Gas Light Company's well-arranged exhibit gives visitors a splendid idea of the industry's progress in recent years.

Standard Price at Portsmouth.—The Board of Trade have fixed the standard price of gas in Portsmouth at 11·8d. per therm. The Board's original Order was 1s. 4d., but application for a reduction was made by the Portsmouth Corporation, who asked that the standard price should be 10·7d., *plus* such sum as the Board of Trade might determine was due to the Portsea Island Gas Company on the value of improvements of manufacture and economies introduced by the Company. The Company agreed to the figure of 10·7d., but asked that the sum in respect of improvements should be fixed at 1·2d. The Board decided on 1·1d., making the new standard 11·8d. as indicated.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There has appeared in the "London Gazette" the following further notice regarding applications to the Board of Trade under the Gas Regulation Act.

DECLARATION OF CALORIFIC VALUE.

Burnham (Somerset) Gas Company, Ltd.—480 B.Th.U. in substitution for 450 B.Th.U. (Jan. 1, 1925.)

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Bedwellty Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers in any portion of their area of supply shall be 18·4d. per therm.

After the declared date, the prices of 16d., 17·2d., and 18·4d. per therm respectively, shall be substituted for the prices of 4s., 4s. 6d., and 5s. per 1000 c.ft. mentioned in section 52 (price of gas for public lighting) of the Bedwellty Urban District Council Act, 1912.

Prepayment meter clauses are included. (Oct. 1.)

Nuneaton Gas Company.

After the declared date, the standard prices in respect of gas supplied by the undertakers shall be 15·8d. and 17d. per therm, and these prices respectively shall be substituted for the prices of 4s. and 4s. 6d per 1000 c.ft. mentioned in section 58 (standard price of gas with sliding-scale as to dividend) of the Nuneaton Gas Act, 1886.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by two-and-four-fifths. (Sept. 18.)

SMOKE ABATEMENT EXHIBITION AT MANCHESTER.

The Smoke Abatement Exhibition which is to be held in Manchester in November will be the occasion of an important conference on the same subject. The conference will hold its meetings in the Lord Mayor's Parlour in the Town Hall during the first three days of the exhibition. It will be opened by the Lord Mayor, who is also President of the exhibition, and on the first day there is also to be a luncheon, for which invitations have been sent out to a large number of the bigger municipalities in the country.

The mornings of the second and third days of the conference are to be occupied by visits to the Bradford Road Gas-Works and the Barton Power Station. Each afternoon and evening will be devoted to addresses and discussions on various aspects of smoke pollution and smoke abatement. A list of these addresses is given below:

Nov. 4.—"Smoke Legislation in England and America," by Mr. J. W. Graham, Chairman of the Smoke Abatement League of Great Britain; "The Possibilities of Smoke Prevention under the Public Health Act, 1875," by Mr. R. Morton Rowe, Chief Smoke Inspector, Manchester; "Air Pollution," by Dr. J. S. Owens, Hon. Secretary to the Advisory Committee on Atmospheric Pollution, Meteorological Office, Air Ministry; "Diagrams on Measuring the Extent of the Smoke Evil," by Dr. J. R. Ashworth, of Rochdale; "The Effect of Atmospheric Impurities on Buildings," by Sir Frank Baines, Director of H.M. Office of Works; "The Work of the Departmental Committee on Smoke Abatement," by Prof. Cohen, of Leeds University.

Nov. 5.—"A Description of the Smokeless Fuel Plant for Glasgow," by Mr. Robert M'Laurin; "Some New Aspects of Low-Temperature Distillation," by Mr. Harald Nielsen; "Coalite," by Mr. George H. Roberts and Mr. P. C. Pope; "The Effect of Light on Health," by Prof. Leonard Hill, Director of the Department of Applied Physiology at the National Institution of Medical Research, and Dr. R. Veitch Clark, Medical Officer of Health, Manchester; "The Complete Gasification of Coal; its bearing upon Smoke Prevention and Fuel Economy," by Mr. T. Roland Woolaston; "Pulverized Coal," by Mr. J. T. Dunn; "Are Smoke Inspectors an Unnecessary Nuisance?" by Mr. H. G. Clinch, Chief Smoke Inspector, Halifax; "Smoke Abatement and Boiler-room Economies in Relation to the Training of Boiler Firemen," by Mr. James T. Hodgson, Lecturer on the Management of Stationary Boilers and Smoke Abatement in the College of Technology, Manchester; "Boiler Design," by Mr. W. H. Casmey, of Wakefield.

Nov. 6.—"Gas Undertakings as Fuel Providers," by Sir Arthur Duckham, President of the Institute of Chemical Engineers; "The Fuel of the Future," by Mr. F. W. Goodenough, Executive Chairman of the British Commercial Gas Association; "Gas Coke in Relation to Industrial and Domestic Smoke Prevention and Fuel Economy," by Mr. E. W. L. Nicol, Engineer and Fuel Expert to the London Coke Committee; "How Electricity Can Help in Smoke Abatement," by Mr. Julius Firth; "The Influence of Electricity on the Domestic Smoke Problem," by Mr. J. W. Beauchamp, Director and Secretary of the British Electrical Development Association; and a paper by Professor Miles Walker.

The conference will conclude with a popular lecture, on the evening of Nov. 6, on "The Cost of a Smoky Atmosphere," by ex-Bailie W. B. Smith, of Glasgow.

SKEGNESS SPECIAL GAS ORDER.

Urban District Council and the Sale of Gasfittings.

Application is being made by the Skegness Urban District Council to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act, to enable them to ensure a satisfactory supply of gas to the consumers by the carrying into effect of various suggested provisions. These provisions relate mainly to specifying the minimum size and the materials of pipes and fittings to be laid on any premises either in the first case or on the occasion of any renewal. The Council also ask for the deletion from their existing Act (1915) of a prohibition to lay pipes themselves on the consumers' premises beyond the meter, and to sell gasfittings, &c., except through a contractor. This last clause of the Order has aroused some opposition in the town, and consequently on Wednesday, the 18th inst., Mr. H. C. HONEY (Director of Gas Administration, Board of Trade) held an inquiry into the matter in the Council Offices, Roman Bank, Skegness.

Mr. W. FREARSON (the Clerk to the Council), after explaining that the object of the Order was to extend the powers contained in the Council's Act of 1915, took a preliminary objection that the Statutory Rules and Orders governing such procedure in regard to Special Orders had not been complied with in a material respect. Rule V. stated that any objection should state (*a*) the specific grounds of objection, and (*b*) the omissions, additions, or modifications asked for. This, he contended, had not been done.

Mr. HONEY said he did not want on a technicality to avoid hearing any material objections, and he did not suppose the Council wished to press their point so as to shut out anything that might be really relevant to the consideration of this application. At the same time, it was very desirable, of course, that the applicants for an Order should know precisely what they had to meet before the inquiry took place.

Mr. H. H. RUSSELL (who appeared for certain objectors) remarked that he was consulted at the last minute. He had not then a copy of the Order by him, and could not get one locally.

Mr. HONEY did not think, having regard to the nature of the application, that the Council would be materially hampered by the fact that Mr. Russell had put his objections in a somewhat vague form.

Mr. FREARSON then proceeded to outline the circumstances in which the gas undertaking came into the possession of the Council. In November, 1913, the Council promoted a Bill in opposition to one promoted by the then Gas Company. The gas clauses were struck out of the Council's Bill in the House of Lords; and in the Commons the Council applied for the insertion in the Company's Bill of a purchase clause. After a very long hearing, the House of Commons decided in favour of the Council, and inserted the clause. Accordingly in the following November the Council promoted a Bill to take over the undertaking, and this became the Skegness Urban District Council Act of 1915, clause 23 of which was now under consideration. This clause was in the following terms—

> 23. (1) The Council may purchase, sell, let for hire, fix, repair, and remove, but shall not manufacture, engines, stoves, ranges, pipes, and other gasfittings for lighting, motive power, heating, ventilating, cooking, or any other purposes, and may provide all materials and work necessary or proper in that behalf, and with respect thereto may demand and take such remuneration or rents and charges and make such terms and conditions as may be agreed upon.
>
> (2) The Council may enter into contracts for the execution of any of the powers of this section, and shall not themselves lay any pipes on the consumer's premises except between the main of the Council and the consumer's meter, nor shall they sell any such gasfittings as aforesaid except through a contractor.

The Council did not take over the concern until June, 1917. The war was on, and there was considerable hesitation on the part of the Council as to whether they should exercise their option; but ultimately they determined to do so. An arbitration was held, and the cost of the acquisition of the undertaking was £44 309. As a result, the Council started their possession of the undertaking with a heavy load, and since the taking over of the works, rates in aid had been necessary to the extent of some £14,000. The war had a disastrous effect on Skegness, owing to its position, and the undertaking was carried on with a great deal of difficulty. The foreman of the works managed them until the appointment of the present Manager in April, 1923. Nothing could be done to improve matters during the dark days of the war and immediately after; and now that the Council had got properly to work it had been found that their Act was defective in respect to the section already quoted. In the draft Order, the Council asked only for the deletion of the words: "nor shall they sell any such gasfittings as aforesaid except through a contractor;" but in the opinion of the Gas Committee now, the deletion of these words would not carry them quite far enough. A great deal depended upon the construction placed upon the earlier part of the sub-section—"and shall not themselves lay any pipes on the consumer's premises, except between the main of the Council and the consumer's meter." If these words could be construed as meaning between the main of the Council and the consumer's stove, the proposal contained in the draft Special Order would probably meet the case, but if not—and the Council would not, even after the granting of the Special Order, be able to connect the stove to the main—then the Council's requirements could only be met by the deletion of the whole of sub-section 2 of section 23 of the Act of 1915. Therefore at the outset, if it was within the power of the Board to do this, and he assumed that it would be, without further notice, he would ask for the deletion of the entire sub-section. The remaining portion of the Order was to enable the Council to specify the pipes and fittings to be provided on premises by owners or occupiers. The district was now increasing in population very rapidly, and he believed was on the eve of still greater development. It had suffered a violent setback during the war.

Mr. RUSSELL said his objection was not to the portion of the Order last referred to.

Mr. *Fred Young*, Assoc.M.Inst.C.E., said he commenced his duties as Gas Manager to the Skegness Urban District Council in April, 1923, and had found himself seriously handicapped in his endeavours to advance the Council's gas undertaking in consequence of the non-possession of the powers now asked for. Only the entire deletion of sub-section 2 of section 23 would enable the Council efficiently to conduct the distribution side of their business. The question of gas-stoves was a very sore one in Skegness, and there were large numbers of disappointed applicants who considered it time the Council did something to meet their requirements in this important matter. When one remembered that the bulk of gas supplied in the district was for cookers, it would be appreciated how urgent the matter was, not only in the interests of the consumers generally, but in regard to the expansion of gas sales. Since he had taken up his appointment at Skegness, he had received innumerable inquiries as to when the Council were going to recommence the supply of new cookers; and in view of his having recommended the policy of supplying on the hire-purchase system, some of the consumers had asked that their names might be placed on a waiting list, so as to ensure first attention when the Council should obtain the necessary powers. Many new residents coming from other towns—from Nottingham and Leicester especially—who had been accustomed to having their wants attended to by their respective Gas Departments, had come to him to order cookers, and were very much surprised that the Council could not supply. In fact, some of them were occasionally more than surprised, and he had been the recipient of many uncomplimentary remarks from new consumers whose requirements he had been unable to meet. He had had to refer them to traders in the town, but in such circumstances it was quite within the power of the trader to persuade a customer to buy some alternative form of cooking appliance, thereby losing the Council the opportunity of selling their gas. This introduced another aspect of the question, which would become more important as time went on. Of course, the Council claimed that, in selling gas, they were selling the best and most widely useful form of energy for the general householder; but it must not be overlooked that there were competitors. Competition they did not fear, but they asked to be allowed to meet it on level ground, and with their hands untied, in common with the majority of other gas undertakings in the kingdom. In recommending the Council to ask for the entire deletion of sub-section 2, it was not with the object of starting an extensive business in fittings. The Council, he knew, desired to use the powers asked for only so far as would enable them properly to serve their consumers and to increase the sales of gas. With regard to the other part of the Special Order, this was to ensure the consumer's getting a proper supply of gas. Of the new houses built each year, some were fitted-up with piping of quite inadequate dimensions. The result was a dissatisfied consumer and complaints as to pressure, &c. Some of the builders consistently fitted-up houses with piping of sufficient capacity, and it would be to their benefit when tendering for new work if this were made obligatory upon all.

Mr. RUSSELL: How is it people have not had stoves?

Mr. *Young* replied that costs had gone up so much that simple hire was not an economical proposition. He thought, however, a hire-purchase arrangement would be profitable, and at the same time would be of great service to the consumer.

Mr. HONEY: What are the numbers of ordinary and prepayment consumers?

Mr. *Young* said there were 442 ordinary meters and 1118 prepayment, a total of 1560 consumers. Of the 680 stoves, 79 were let on rental to ordinary consumers, and 601 were supplied free to prepayment meter users. The differential price to prepayment consumers was 3⅜d. per 1000 c.ft., equal to 0·8d. per therm. The applications for stoves from ordinary consumers were so few that he had been able to keep them going with second-hand ones, as occasionally he got one in. As he had said, 79 of the ordinary consumers had cookers on rent from the Council, but he thought about three-fourths of the 442 ordinary consumers had a cooker. Some bought them outright from traders in the town, while others brought their own stoves with them when coming to reside in Skegness. In consequence of the difficulty in getting gas stoves, he had known people to go in for oil. There were no records by which they could tell the numbers of stoves hired from the old Gas Company, and, besides, many of the ordinary consumers of that time had now prepayment installations.

Mr. HONEY: I am not surprised, because you are subsidizing your prepayment consumers at the expense of the ordinary consumers.

Mr. *Young* pointed out that it was the policy of the Council to encourage people to become prepayment consumers, because of the difficulties of collection, which formed a troublesome question in Skegness. Many people went there to stay a month or two in bungalows, &c., and then left the town, and, of course, for a good part of the year numbers of the houses were unoccupied. What the Council wanted was to be able to supply stoves on hire-purchase, because a lot of people who could not afford to buy them outright would not object to paying a reasonable sum for them by instalments. The Council also desired to be able to fix them; without power to do this, the whole thing would be useless.

Dr. *B. Sweeten* (the Chairman of the Gas Committee) stated that until recently the gas had been poor, but the works were now in very good condition, and capable of supplying excellent gas. There was a considerable demand for gas stoves in Skegness, and people naturally came to the Council for them. They therefore desired power to supply them on hire purchase, and also to fix them. If they were to be responsible for furnishing a good gas supply, they wanted to see that everything was in proper order. They were not anxious to go into the fittings business, but where they were supplying gas to cookers—one of the main features of the undertaking—they wanted to have control over them as far as possible.

Mr. HONEY: The Council have no gas showroom in the town?

Mr. RUSSELL: No, but there is a trader's gas showroom in the town, where an exhibition is held periodically. If the words referred to are removed from the Act, the Council will be in a position to compete with local tradespeople (who are very large ratepayers) in the supply and fixing of gasfittings, &c., and such competition would be very serious for them in a small place like this. No doubt larger towns have the power now sought, but the population of Skegness in winter time is only about 6000. Messrs. Wheatley, in High Street, are gas and water

engineers, and they supply every sort of gasfitting or cooker. The Council may let for hire.

Dr. *Sweeten*: We cannot supply them on hire; that has been the difficulty all along.

Mr. RUSSELL: If the Council hired stoves out, they could meet all the requirements. Very few people desire to purchase a gas-stove, because if they move out of the town they have to dispose of it at a heavy loss.

Mr. HONEY: You have therefore to show me that your clients would be injured by the acquisition by the consumers of their own stoves on the hire-purchase system, as against having the temporary user of the stove on the hire system.

Mr. RUSSELL: It would mean any gasfitting whatever, including fittings for lighting and everything else. If the words were removed, the Council could specify that a certain fitting should be used which they could supply, and in this way create a monopoly.

Mr. HONEY: How could they do that? Under what power could they prescribe a particular class of fitting? I want to know what you are afraid of.

Mr. RUSSELL: The thing we are afraid of is the Council's entering into competition with the tradesmen, which, in a small place like this, where there is not a great deal of work, would be very serious. Again, if the Council take up the supply of these fittings, I maintain it can only be done at a loss, and this loss will fall on the ratepayers.

Mr. HONEY: I should like to know what measures are taken at present by the people who supply stoves in the way of maintenance and repair.

Mr. *H. Wheatley*, a gas and hot water engineer with business premises in High Street, said he supplied gasfittings, gas stoves, and all accessories. He kept a large stock of cookers and all kinds of fittings. During the last three years he had supplied 200 gas-cookers in Skegness, outright and on hire-purchase. People came to him for a cooker because they could not get one on simple hire from the Council. People would gladly pay a rent for a cooker, if the Council would supply one on these terms. If the words suggested were deleted from the Act, it would give the Council a monopoly, because they would be able to make conditions. He had held three exhibitions, to show people what they could get in the way of up-to-date apparatus, and he thought that the demand was fairly met as far as purchase or hire-purchase was concerned. In the matter of renting, he had no wish to enter into competition with the Council. So far as cookers were concerned, the Council already had power to let them on hire; it was the fittings business he wished to preserve from competition with the Council. Since Mr. Young had been at Skegness, the gas-works had been tremendously improved, but, if this proposal were granted, and many more cookers were put on, it would without a doubt involve further additions to the works. He did not do anything in the matter of maintenance.

Mr. FREARSON: How many tradesmen deal in gas stoves and fittings?

Mr. *Wheatley*: About ten.

Mr. FREARSON: Then do you not realize that if this Order be granted it will not create any monopoly? If there are ten traders now supplying these things, there will then be eleven.

Mr. *Wheatley*: If we get people trading whether it pays or whether it does not pay, that is not fair competition. Further, this new scheme is going to result in a charge on the rates. In the first place, it will mean a showroom in the town, which will entail great expense. Before the Council refused to supply on hire, I did not do any business in cookers.

Mr. HONEY: You would not object to any provision enabling them to let out stoves and fittings on the hire system?

Mr. *Wheatley*: They have that power now, and we do not want it altered.

Mr. *J. G. Dunkley*, a builder, said he did not want to see the Council start another department in competition with the traders of the town. Besides this, the Council could not take a showroom in a prominent position for the display of goods and make a paying concern of it. He was present as a ratepayer to protest against public money being wasted.

Mr. HONEY: What is there to prevent the Council from making an arrangement (say) with Mr. Wheatley to act as their agent?

Mr. *Wheatley*: They have power to do that.

Mr. HONEY: But what about the other traders?

Mr. *Wheatley*: Well, one firm could do it one year, and another the next. It would be a wise precaution, to prevent the Council wasting money. Replying to a question by the Inspector, he said there were a fair number of gas fires in use, but very few geysers.

Mr. HONEY: Who is interested in seeing that these geysers are fixed in a safe and satisfactory manner? Supposing somebody is accidentally killed, not by the gas, but by the products of combustion, who would get the blame?

Mr. *Wheatley*: If I fixed the geyser, I should.

Mr. HONEY: Yes, but who would lose the business?

Mr. *Dunkley*: If the Council keep the mains and pipes to the meter in order and up to date, it will take them all their time, without doing any business in stoves and fittings.

Mr. *H. Lill* said it was the refusal of the Council to let stoves on hire that had led to all the trouble. He would oppose the setting up of a branch of trade for the supply on hire-purchase of gas apparatus. The demand was already well catered for.

Other ratepayers expressed their objection to the Council touching gasfittings apart from cookers.

Mr. *W. Greetham* contended that it was impossible for the Council to keep a stock of fittings in good condition on the gas-works, owing to the effect of the fumes on the lacquer, &c., and they could not afford to have a showroom in the town.

Mr. HONEY: Suppose the Council adopt the suggestion to hire out stoves only, will not they require a showroom?

Mr. *Greetham*: Not for stoves; they can keep them on the works. They are different from brass and other fittings.

Mr. *A. Davis* stated that he knew a good many people in the town who were not in a position to pay from £5 to £7 for a stove, but if they could obtain one on hire-purchase terms, he thought they would do so. There was a big objection in the town to the paying of a rent for a stove.

Mr. RUSSELL then handed in a petition signed by a number of ratepayers.

Mr. FREARSON said all the large Corporations had the powers now sought by the Skegness Urban District Council, and as indicating what they wished to be empowered to do, he read from "Michael and Will" sub-section 3 of section 26 of the Model Gas Bill. Section 26 ("Power to Supply Gasfittings") is in the following terms:

> 26—(1) The Company may purchase sell let for hire fix repair and remove but shall not manufacture engines stoves ranges pipes and other gasfittings for lighting motive power heating ventilating cooking or any other purposes and may provide all materials and work necessary or proper in that behalf, and with respect thereto may demand and take such remuneration or rents and charges, and make such terms and conditions as may be agreed upon.
>
> (2) Any fittings let for hire under the provisions of this section shall not be subject to distress or to the landlord's remedy for rent or be liable to be taken in execution under process of any court or proceedings in bankruptcy against the person in whose possession the same may be: Provided that such fittings are marked or impressed with a sufficient mark or brand indicating the Company as the actual owners thereof.
>
> (3) Provided as follows:
>
> (*a*) The Corporation shall so adjust the charges to be made by them for any such fittings or for the fixing repairing or removal thereof as to meet any expenditure by them under the powers of this section in connection therewith (including interest upon moneys borrowed for those purposes and all sums applied to sinking fund for repayment of moneys so borrowed).
>
> (*b*) Every sum charged by the Corporation in respect of the provision of such fittings or the fixing repairing or removal thereof shall be separately stated on every demand note delivered by the Corporation to the consumer.
>
> (*c*) The total sums expended and received by the Corporation in connection with the purposes in this section mentioned in each year (including interest and sinking fund) shall be separately shown in the published accounts of the gas undertaking of the Corporation for that year.

Mr. HONEY: There is a point of policy involved in this which will require some consideration by the Board of Trade, and the decision will be given in due course.

Watford Gas Company's Co-Partnership.—The Watford Gas and Coke Company Co-Partnership Committee report that the bonus and interest paid by the Company for the year ended June 30 amount to the substantial sum of £1116. The nominal value of the stock allotted to the co-partners is £8806—an increase of £1269 during the year. The Committee are pleased to note a further increase in the contributions paid by the co-partners into the withdrawable account of the fund.

New Plant at Newbury.—At a meeting of the Newbury Corporation Gas Committee a report was presented with reference to the installation of a sulphate of ammonia plant at a cost of £1770. A letter has been received from the Unemployment Grants Committee stating that a grant of 50 p ct. of the interest on a loan not exceeding £1770 will be made for a period of fifteen years, upon the usual conditions. A letter has also been received from the Ministry of Health enclosing formal sanction to the borrowing of £1770 for the purposes of the scheme, repayable as to £1100 in fifteen years, and as to £670 in thirty years. The Committee decided, subject to the approval of the Council, and to a satisfactory report being submitted by the Gas Engineer after inspection of similar plant installed by Messrs. R. Marsh, Ltd., of Watford, that the tender of this firm for the provision and fixing of plant capable of producing 30 cwt. of sulphate per 24 hours, be accepted.

Furnaces at Gas-Works Extinguished.—Anglesey received the force of the gale last Friday night. A stream running through some allotments belonging to Lord Sheffield at the top of King's Road, Holyhead, overflowed its banks. So great was the force of the water caused by the heavy rain that it carried away a 6-ft. wall, and rushed down the road in torrents, sweeping everything before it. Houses were flooded and excavations were made in the road itself. At the foot of the road which joins that leading from the town to Trearddur Bay the water attained a height of over 3 ft., and poured into the yard of the Holyhead and North Wales Gas and Water Corporation. It got into the subway of the regenerator of the furnaces, and extinguished the fires, with consequent damage to the brickwork. From eleven o'clock on Friday night until late on Saturday, employees of the local authority were working continuously in clearing the ravages caused by the flood.

Local Authorities and "Direct Trading."—A vigorous protest was made in the Oswaldtwistle District Council against a system of direct trading instituted by the Gas Committee in the supply of hot water apparatus to the public. It was contended that ironmongers and plumbers were already qualified to supply these commodities, and that it was unfair for the Council to trespass on their domains. Councillor Taylor argued that it was outside the function of local authorities to go beyond essential communal services. These boilers could be supplied by private traders, who had been in the business for years, and it was never intended that public money should be used to finance trading operations which could be discharged by private tradesmen. The Council were now going to spend £2000 on a showroom to demonstrate these articles, irrespective of whether this would ever pay. Of course, expenditure did not matter—the money could be taken from the rates, and he presumed this would be done. Let the Gas Department be a gas department, and not start interfering with private traders in their individual businesses. A proposal to defer the matter back was defeated, and the minutes were confirmed.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Another week has passed without any appreciable change in coal trade prospects. If anything, there has been even more idle time this week than usual. On the other hand, there has been, in some quarters, a slight feeling that perhaps curtailed production all round may be beginning to make itself felt. Prices are no lower; but they cannot be expected to be, as practically all new business has been taken for some time at figures below the cost of production, and, even with the help of higher-priced contracts still running, it is safe to say that nearly all collieries are running at a loss. But it seems that in several cases turns are rather fuller for the next fortnight or so than they have been lately, and once again people are hoping that low-water mark has been reached.

There is still no sign of any improvement for the future, and prospects for next year are at present as black as ever. It is truly difficult to see how we are to compete, at our present cost of production, with ever-increasing outputs of cheap coal at practically all Continental centres.

A slightly better inquiry was said to be noticeable by sellers of Northumberland steams and Durham unscreened coking, though good qualities of the latter are plentiful at 18s. to 18s. 6d. This compares with the nominal quotation of 22s. for best gas makes, and 22s. 9d. for Wear Specials; but these prices can be discounted when it suits colliery positions. All the same, the firmness which they have displayed throughout the slump, as compared with other coals, has been remarkable, and in great contrast to other qualities of gas coal, which are obtainable in plenty as low as 17s.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

There is little change of any moment to record this week. Some very slight improvement is to be noted in the condition of the Lancashire market for fuel; but its development is one of painfully slow growth. A few more merchants are now disposed to buy house coal for winter requirements, and have grown tired of sitting on the fence waiting for the prospect of buying more advantageously. Generally colliery prices remain unchanged, and the indications are that fuel is more likely to be dearer than cheaper as the season advances.

The week has witnessed a slight revival in the industrial fuel market in Lancashire; but as yet the movement is little more than negligible. In Yorkshire it is practically a case of "as you were." At Leeds, Sheffield, and Hull the tone of the markets has been flat. Best steam hards have been in best demand at Sheffield with the majority of the output going for export, and only a slight improvement in the home demand.

Furnace and foundry coke remain quiet at approximately 24s. at the ovens and 26s. f.o.b. The demand for gas coke has been slightly stronger at firm prices.

For the week ended Sept. 16 the exports of coal from Hull amounted to 33,790 tons, as against 67,401 tons for the corresponding period of last year.

The prices ruling have been: Bunkers—Yorkshire, Derby, and Notts large screened steam, f.o.b. Humber ports, 20s. to 21s. Cargo for export, f.o.b., Best Yorks hards, 23s. 6d.; Derby best hards, 24s. 6d. to 25s. 6d.; West Yorks Large Hartleys, 21s. to 24s.; South Yorks washed doubles, 19s. 6d.; South Yorks washed singles, 18s. 6d.; dry doubles, 17s.; South Yorks washed smalls, 16s.; Derby slack, 1 in., 13s.; South Yorks rough slack, 14s.; gas coke, 35s. to 36s.; foundry furnace coke, 25s. 3d. to 25s. 9d.; washed steam thirds, 19s. 3d. to 19s. 6d.; and South Yorks washed trebles, 22s. 6d. per ton.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

Some of the collieries which depend largely on the gas undertakings are feeling the effects of the heavy stocking that has taken place. Contract deliveries are going through regularly; but conditions have become very rigid. The margin of consumption not contracted for is not large, and can be satisfied at easy rates.

Prices of house coal show no material change. They are very strong as regards the better qualities. Low grades are relatively cheap on account of the continued dulness of the demand for industrial fuel. Steams generally are not being taken up on a scale to extend productive resources. Values are consequently on the weak side. Transactions in smalls are conducted in circumstances favourable to the buyer. Spot lots of slack have been bought down to 7s. 6d.; but the general level is 2s. higher than this. Smudge has changed hands at nominal rates in order to keep traffic clear. In the Cannock Chase and Warwickshire area, collieries are working full time, and have heavy arrears of orders to clear off. Most of these orders have been rushed in almost simultaneously since the holidays. So far as orders from the domestic consumer are concerned, the autumn trade is about six weeks ahead of the usual flow. Some reaction is now declaring itself.

There are no marked indications of an over-supply of coke in this district, though hard blast-furnace qualities are more plentiful. The experiment of grading the price according to analysis is said to have succeeded so far as it has gone. A good number of Midland blast-furnaces have adopted the scheme.

In connection with the Accrington District Board, special cookery lectures were given in the Mercer Hall, Great Harwood, last week, by Miss H. H. Tuxford. This is part of a campaign to popularize the use of gas.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 22.

Pitch, on the London market, remains quiet—*i.e.*, there is very little new business on hand; but makers are busy shipping quantities already sold. The present idea of price is nominally 56s. to 57s. 6d. net per ton. Creosote is in better demand, and the price is about 6¼d. net per gallon in bulk *ex* makers' works. Motor benzole is rather lower, in keeping with the drop in the price of petrol.

Tar Products in the Provinces.

Sept. 22.

There has been little alteration in the market for tar products during the last week, except pitch, which is decidedly easier; business having been reported at outside London works at 46s., and on the East Coast at 47s. 6d., while continental buyers mention 45s. to 47s. 6d. f.o.b. Creosote is steady at existing prices. Carbolic acid is still quiet; and there is little or no business doing in crystals. Cresylic acid is steady; but there is little demand. Naphthalene remains neglected, and sales are very difficult to negotiate.

The average values for gas-works products during last week were: Gas-works coal tar, 35s. to 40s. Pitch, East Coast, 45s. to 47s. 6d. f.o.b. West Coast—Manchester, 40s. to 41s. 3d.; Liverpool, 41s. 3d. to 42s. 6d.; Clyde, 42s. 6d. to 45s. Benzole 90 p.ct., North, 1s. 2d. to 1s. 3d.; crude 65 p.ct. at 120° C., 9d. to 10d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s. 2d. to 1s. 3d., nominal. Coal tar crude naphtha in bulk, North, 7d. to 7¼d. Solvent naphtha, naked, North, 1s. to 1s. 1d. Heavy naphtha, North, 1s. to 1s. 1d. Creosote, in bulk, North, liquid, 5d. to 5¼d.; salty, 4⅞d. to 5⅛d.; Scotland, 5d. to 5⅛d. Heavy oils, in bulk, North, 7d. to 7¼d. Carbolic acid, 60 p.ct., 1s. 7½d. to 1s. 8½d. prompt. Naphthalene, £13 to £15; salts, £5 to £7, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Manchester District Tar Prices.

The average price realized in the Manchester district for the sale of tar, according to the sliding-scale, for July was £2 14s. 8·48d. per ton.

TRADE NOTES.

The "Foster Duplex" Gas Governor.

The Foster Engineering Company, Ltd., have sent us a description of their "Foster Duplex" governor, which is suitable for all pressures up to 27 in. of water. Oscillation in the outlet pressure due to chattering valves is overcome by the special construction of the diaphragm and baffle chambers round the spindle.

"Rafrakton."

This is a new word; and Messrs. Drakes Limited, of Halifax, maintain that it is also a new standard. "Rafrakton" is an iron which is the outcome of years of research and experiment. It combines strength with elasticity in a remarkable degree, state the firm; and these attributes of toughness and durability have far-reaching effect on castings subject to sudden stresses or extremes of heat.

Staniforth Lamps and Fittings.

A most helpful catalogue has been prepared by Messrs. H. Staniforth & Co., Ltd., Broadway Works, Cricklewood Broadway, London, N.W. 2. Besides giving full particulars of the various fittings manufactured by the firm, the new list contains ten pages of very useful illumination data, and there are several blank pages for additional notes. Gas engineers and salesmen will certainly welcome this new issue.

Cockey Holders.

Messrs. Edward Cockey & Sons, Ltd., of Frome, have recently completed a new three-lift spiral-guided gasholder, having a capacity of 200,483 c.ft., to the order of the Ryde Gas Company; and a two-lift standard-guided holder and steel tank for the Portland Gas-Works (capacity 112,500 c.ft.). The firm have also recently supplied a standard-guided holder (capacity 614,000 c.ft.) to the Footscray Works of the Colonial Gas Association; and a single-lift holder to the Gibraltar Gas Company (capacity 107,000 c.ft.)

Developments in Buckhaven and Methil Area.—Presiding at a meeting of the Buckhaven and Leven Gas Commission, Bailie Rolland stated that during the past quarter there had been a large increase in the manufacture of gas. The installation of high-pressure pipes and plant was being pushed forward. With a view to increasing the capacity of the Leven Works, three adjoining properties had been purchased at a cost of £1350.

British Gas Light Company, Ltd.—At the annual general meeting to-day, the Directors, in submitting the report and accounts for the year ended June 30, will report that, after providing for interest on debentures and debenture stock, the net revenue amounted to £50,911, which, with the undivided balance brought forward from the preceding year, left an available balance of £103,626. From this sum the Directors have paid the dividend at the rate of 7 p.ct. per annum on the cumulative preference stock and an interim dividend at the rate of 3½ p.ct. on the ordinary stock. They now recommend that the payment of these dividends be confirmed, and that a final dividend on the ordinary stock at the rate of 4 p.ct., less income-tax, making 7½ p.ct. for the year, be paid on Oct. 3. This will amount to £26,505, and leave a balance of £46,929 to be carried forward. The quantity of gas sold was 6¾ p.ct. more than in the year to June, 1923.

STOCK MARKET REPORT.

In spite of rumours at the commencement of last week of an early General Election in connection with the Russian Treaty, there was considerably more activity in some sections of the Stock Exchange. Gilt-edged securities were the chief feature, and some heavy buying was reported. The 5 p.ct. War Loan finished with a rise of $\frac{3}{16}$ to 102-$\frac{3}{16}$. Conversion Loan was $\frac{1}{2}$ up at 77-$\frac{15}{16}$, and Funding Loan rose $\frac{3}{8}$ to 90-$\frac{7}{8}$.

The particular features of the Industrial Market centred round a revival of interest in Shipping shares brought about by the improvement in freights, and also a recovery in Iron and Steel shares. Textiles generally were dull; Courtaulds being an exception. There was a good demand for Tea shares, and prices are still moderate in relation to last year's dividends.

The official announcement of the provisional agreement in respect of the amalgamation of the Gas Light and Coke Company and the Brentford Gas Company appeared in the Press last week. No details have been published, but it is proposed that the arrangement, which is subject to the sanction of Parliament, shall take place as from Jan. 1, 1926. As will be seen by the Table, the Gas Light ordinary stock rose 2½ points on the week, closing at 92-95; and the Brentford "A" and "B" stocks were both 4 points up at 110-115.

Comparing the prices of the stocks or shares of those gas companies in England whose ordinary capital issues are under £300,000, we find that the yield per cent. per annum varies from £6 2s. 8d. in the case of the Aldershot Company to £7 9s. 7d. in the case of the Tynemouth Company. Plymouth 5 p.ct., realizing £6 17s. 7d., North Middlesex 10 p.ct. £10 shares, £6 17s. 6d., Maidstone 5 p.ct. £6 18s. 9d., and Hornsey 7 p.ct. £7 2s. 5d., are attractive.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 65, Brentford "A" 108½, "B" 107, 108½, 4 p.ct. debenture 78, British 118⅝, European 8⅛, Gas Light and Coke 91, 91⅛, 91⅜, 91½, 91⅝, 91¾, 91⅞, 92, 3½ p.ct. maximum 62⅜, 63, 63½, 4 p.ct. preference 79½, 3 p.ct. debenture 60½, 61, Imperial Continental 167½, 168, Primitiva 6s. 9d., 7s. 0⅜d., 7s. 3d., 4 p.ct. debenture, 1911, 54⅛, South Metropolitan 3 p.ct. debenture 60½, 60⅝, South Suburban 5 p.ct. 102, Southampton 86. Supplementary prices, Uxbridge 4 p.ct. debenture 76.

On Tuesday, Alliance and Dublin 66, 4 p.ct. debenture 67, Bournemouth 5 p.ct. 12⅛, 12-16/16, Brentford "A" 108½, 109, "B" 107½, 108, 4 p.ct. debenture 77½, Brighton and Hove original 171, 172, Commercial 4 p.ct. 89, 3½ p.ct. 89½, 3 p.ct. debenture 57½, Continental Union 42, 7 p.ct. preference 89, 89½, 91, Gas Light and Coke 91½, 91-3/8, 91-7/8, 92, 3 p.ct. debenture 60⅛, 61½, Imperial Continental 166½, 166⅞, 167½, 167⅝, 168, 168½, 169½, Lea Bridge 5 p.ct. 96½, 97⅛, Montevideo 57½, Primitiva 7s. 3d., 7s. 4½d., 4 p.ct. 1st debentures 78½, South Metropolitan 99½, 100, South Suburban 5 p.ct. debenture 98, Southampton 5 p.ct. maximum 86½. Supplementary prices, Eastbourne 3⅛ p.ct. "B" 102, Metropolitan (of Melbourne) 7, Watford 3½ p.ct. "B" 95½.

On Wednesday, Aldershot "C" 82, 82½, Alliance and Dublin 65⅝, 66⅛, Bournemouth 5 p.ct. 13⅛, Brentford "A" 108, 112, 115, "B" 108, 112, 112-16/16, Commercial 4 p.ct. 91, Continental Union 40¼, 40½, 43, European 8, Gas Light and Coke 91⅛, 91⅞, 92, 4 p.ct. preference 78⅜, 3 p.ct. debentures 61½, Primitiva 7s., 7s. 1½d., South Metropolitan 99, 99½, 99¾, 100, 3 p.ct. debenture 61½, 6⅛ p.ct. debenture 101½ *ex* div., South Suburban 5 p.ct. 103, 103⅜. Supplementary prices, South Suburban 7 p.ct. debenture 104⅞.

On Thursday, Bombay 5½, Brentford "A" 112½, 114, "B" 112, 112½, 113, 114, 115, Commercial 4 p.ct. 89, 3½ p.ct. 90½, 91, Gas Light and Coke 92¼, 92½, 92⅝, 93, Imperial Continental 168½, Oriental 100, 101, South Metropolitan 99½, 100, 3 p.ct. debenture 60⅝, 6½ p.ct. debenture 102½ *ex* div., South Suburban 5 p.ct. 104. Supplementary prices, Lea Bridge 7½ p.ct. debenture 104.

On Friday, Brentford "A" 113½, 114½, 114½, Commercial 4 p.ct. 92, Gas Light and Coke 93½, 93¾, 94, 94⅜, 4 p.ct. preference 78½, Hastings and St. Leonards 3½ p.ct. 78½ *ex* div., Imperial Continental 170, 170½, 171, Primitiva 7s. 3¾d., South Metropolitan 99½, 99⅝, South Suburban 5 p.ct. debenture 98, Wandsworth (Wimbledon 5 p.ct.) 112½. Supplementary prices, Dorking 5 p.ct. maximum "D" 21, Rochester (Chatham and Gillingham) 8 p.ct. debenture 107½, 108.

In the Money Market supplies were plentiful, and both loan and discount rates were easier in tendency. There was a drop of a little over 2s. 2d. in the average rate per cent. (£3 13s. 1·09d.) at which Treasury Bills were allotted.

The leading Foreign Exchanges were quiet and rather dull. Sterling on New York closed at 4.46, French francs at 84.05, and Belgian francs at 90.05. Italian lire finished at 101.77½.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5, 1923. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Sept. 19.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c. max. C.	80—83	..	82—82½
235,492	"	"	4	4	Do. 4 p.c. Pref.	68—72	..	..
1,551,868	"	Apr. 3	5½	6	Alliance & Dublin Ord.	63—68	..	65—66½
374,000	"	July 10	4	4	Do. 4 p.c. Deb.	63—68	..	67
300,000	5	May 22	8	8	Bombay, Ltd.	..	..	..
100,000	10	Aug. 14	8½	8½	Bournemouth 5 p.c.	5—5½	..	..
383,110	10	"	7	7	Do. B 7 p.c..	12½—13½	+½	12⅞—13½
150,000	10	"	6	6	Do. Pref. 6 p.c..	11⅞—12	..	..
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb..	10⅞—11⅞	..	..
162,025	"	"	4	4	Do. 4 p.c. Deb..	54—59	..	..
992,045	"	July 10	6½	6½	Brentford A Con.	74—79	..	..
990,500	"	"	6½	6½	Do. B New	110—115	+4	108—115
76,000	"	"	5	5	Do. 5 p.c. Pref.	110—115	+4	107—115
306,690	"	June 12	4	4	Do. 4 p.c. Deb.	87—92	..	..
181,337	"	"	—	6	Do. 6 p.c.Rich.Red.Deb.	75—80	..	77½—78
214,740	"	Aug. 28	11½	11½	Brighton & Hove Orig.	100—105	..	..
244,200	"	"	8½	8½	Do. A Ord.	167—172	..	171—172
1,287,500	"	July 24	5	5	Bristol 5 p.c. max..	123—126	..	..
855,000	"	Mar. 20	—	7	British Ord..	91—92*a*	..	..
100,000	"	June 26	7	7	Do. 7 p.c. Pref..	115—123	..	118½
120,000	"	"	4	4	Do. 4 p.c. Red. Deb..	72—77	..	..
100,000	10	May 22	6	8	Cape Town, Ltd.	64—74	..	..
100,000	10	Apr. 24	4½	4½	Do. 4½ p.c. Pref..	6—7	..	..
100,000	10	June 26	4½	4½	Do. 4½ p.c. Deb..	71—76	..	..
626,860	Stk.	July 24	6	6	Cardiff Con. Ord.	97—100	..	..
237,860	"	June 26	7½	7½	Chester 5 p.c. Ord.	103—106	..	..
157,150	"	Aug. 14	6½	6	Commercial 4 p.c. Cap.	86—91*b*	..	..
1,513,280	"	July 24	6	6	Do. 3½ p.c. Cap.	89—92	..	89—92
560,000	"	"	6	6	Do. 3 p.c. Deb.	89—92	..	89½—91
475,000	"	June 12	3	3	Continental Union, Ltd.	56—59	..	..
800,000	"	14 Jan. 15	—	—	Do. 7 p.c. Pref.	40—45	−2	40½—43
200,000	"	June 12	7	7	Croydon sliding scale	87—92	+2	89—91
660,000	"	Aug. 28	6½	6½	Do. max. div.	99—102	..	..
284,975	"	"	5	5	Derby Con.	82—86	..	..
492,270	"	Aug. 28	9	6	Do. Deb.	107—110	..	..
55,000	"	July 10	4	4	East Hull 5 p.c. max.	74—76*c*	..	..
209,000	"	Apr. 3	5	5	European, Ltd.	..	..	8—8½
1,002,180	10	July 24	2	6	Gas Light & Coke 4 p.c. Ord.	7½—8½	..	..
15,503,045	Stk.	Aug. 14	5½	5½	Do. 3½ p.c. max.	92—95	+2½	91—94½
2,600,000	"	"	3½	3½	Do. 4 p.c. Con. Pref.	61—64	..	62½—63½
4,062,235	"	"	4	4	Do. 3 p.c. Con. Deb.	78—81	..	78½—79½
4,761,930	"	June 12	3	3	Do. 10 p.c. Bonds	60—63	..	60½—61½
130,000	"	"	10	10	Do. 7½ p.c. Ilford Deb.	..	..	..
42,000	"	—	7½	7½	Hastings & St. L. 5 p.c. Conv.	..	..	..
82,500	"	Sept. 11	6½	6½	Do. 3½ p.c. Conv.	95—100*	..	78½
258,740	"	"	5½	5½	Hongkong & China, Ltd.	75—80*	..	..
70,000	10	May 8	10	10	Hornsey 7 p.c.	16—17	..	..
86,600	Stk.	Aug. 14	10	10	Imperial Continental Cap..	138—143	..	..
1,976,000	"	May 22	10	30	Do. 3½ p.c. Red. Deb.	166—171	+1	166½—171
263,950	"	Aug. 14	3½	3½	Lea Bridge 5 p.c. Ord..	68—71	..	..
235,242	"	Aug. 14	6½	6½	Liverpool 5 p.c. Red. Pref.	91—100	..	96¼—97½
2,127,340	"	Aug. 14	5½	5½	Do. 7 p.c. Red. Pref.	88½—89½*b*	..	..
600,000	"	Mar. 20	7	7	Maidstone 5 p.c. Cap.	105—108*b*	..	..
165,736	"	Aug. 28	8	9	Do. 3 p.c. Deb.	120—125	..	..
63,480	"	June 26	3	3	Malta & Mediterranean	53—58	..	..
75,000	5	"	5	7	Montevideo, Ltd.	3½—3¾	..	..
541,920	Stk.	June 12	4	4	Newcastle & Gateshead Con.	54—59	..	57½
1,875,892	"	July 24	5½	5	Do. 4 p.c. Pref..	81—82*d*	−½	81½
250,166	"	"	4	4	Do. 3½ p.c. Deb.	74—75*d*	..	..
529,705	"	June 26	3½	3½	North Middlesex 10 p.c.	70—72*d*	..	..
15,000	10	Aug. 28	11	11	Do. 7 p.c.	15½—16½	..	..
75,940	10	"	7-10/10	7-10/10	Oriental, Ltd.	11—11½	..	..
300,000	Stk.	May 8	9	7	Plym'th & Ston'house 5 p.c.	98—101	..	100—101
138,120	"	June 26	7-7/8	7½	Portsea Island B	112—117	..	..
60,000	50	Aug. 28	13	13	Do. C	99—102	..	..
100,000	50	"	12	12	Primitiva Ord.	95—100	..	6/9—7/4½
2,289,909	1	—	—	—	Do. 4 p.c. Red. Deb..	1-32/32—1-32/32	+1/16	78½
341,400	100	June 2	4	4	Do. 4 p.c. Red. Deb. 1911	76—79	+1	54½
600,000	Stk.	July 24	4	4	Do. B. Aires 4 p.c. Rd. Db.	53—56	..	..
920,335	"	June 26	4	4	Do. R'r F'te 4 p.c. Rd. Db.	54—57	..	..
321,670	"	"	4	4	San Paulo 6 p.c. Pref.	54—57	..	..
150,000	10	Mar. 20	6	6	Do. 5 p.c. Red. Deb.	7—7½	..	..
125,000	50	July 1	5	5	Sheffield A	41—43	..	..
270,000	Stk.	Aug. 28	5/8/4	5½	Do. B	100—102*e*	..	..
419,968	"	"	5/8/4	5½	Do. C	100—102*e*	..	..
1,047,000	10	"	5/8/4	5½	South African	100—102*e*	..	..
90,000	10	June 12	6	5	South Met. Ord.	7—9	..	..
6,609,895	Stk.	Aug. 14	6½	5	Do. Red Pref.	98½—100½	+½	99—100
102,580	"	July 10	5	5	Do. 3 p.c. Deb.	96—98	−2	..
1,895,445	"	"	3	3	Do. 6½ p.c. Red.Deb.	59—62	..	60½—61½
734,000	"	Sept. 11	6½	6½	South Shields Con.	101—103*	..	101—102½
91,500	"	Aug. 28	8½	8½	South Suburban Ord. 5 p.c.	133—135*d*	..	..
1,087,795	"	Aug. 14	6½	6½	Do. 5 p.c. Deb.	102—105	..	102—104
368,837	"	June 26	5	5	South'mpt'n Ord. 5 p.c. max.	93—98	..	98
647,740	"	May 8	5	5	Do. 4 p.c. Deb.	85—88	..	86—86½
121,275	"	June 26	4	4	Swansea 7 p.c. Red. Pref.	73—78	..	..
250,000	"	Aug. 28	7	7	Do. 6½ p.c. Red. Deb.	101½—103½	..	..
200,000	"	June 26	6½	8	Tottenham District A 5 p.c.	102—104	..	..
120,000	"	July 24	8	6½	Do. B 3½ p.c.	116—119	..	..
882,275	"	"	6½	6½	Do. 4 p.c. Deb.	99—102	..	..
181,255	"	June 12	4	4	Tynemouth Con. and New	76—80	..	..
258,251	"	Aug. 28	7/14/4	5	Wandsworth, Wimbledon, and Epsom—	84—86*d*	..	..
30,000	"	July 10	9½	9½	Wandsworth A 5 p.c.	135—140	..	..
235,636	"	"	7½	7½	Do. B 3½ p.c.	113—118	..	..
108,075	"	"	6/7/9	6/9/6	Do. C	96—101	..	..
240,865	"	"	6/7/9	6/9/6	New Ordinary	..	..	..
352,000	"	"	7½	7½	Wimbledon 5 p.c.	110—115	..	112½
98,000	"	"	7½	7½	Epsom 5 p.c..	115—120	..	..
88,416	"	June 26	3	3	3 p.c. Deb.	55—60	..	..

Quotations at—*a*.—Bristol, *b*.—Liverpool. *c*.—Nottingham. *d*.—Newcastle, *e*.—Sheffield. * Ex. div.

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By

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

WALTER KING, LTD., "GAS JOURNAL" OFFICES, No. 11, Bolt Court, Fleet Street, E.C.4.

Stranraer Gas-Works Valuation.—At the Stranraer Burgh Valuation Appeal Court last week—Provost Dyer presiding—the Stranraer Gas Company appealed against the valuation of £914 on works, and £178 on pipes in Stranraer parish, and asked that the value of the works be £713, and of the pipes £379. They accepted the Assessor's valuation of pipes in the Inch and Laswalt portions of the burgh. After proof, the Court upheld the Assessor's valuation, holding that the Company had failed to show from the books and accounts the structural expenditure on the works and pipes in Stranraer parish, and mentioned that the Assessor had proceeded on the same basis as he had done, and as had been accepted by the Company, for the previous five years. The Company asked for a stated case.

Irish Gas Concerns.—Messrs. J. W. Gray and James Lester have been appointed Directors of the Armagh Gas Company in room of the late Messrs. J. Gray and T. W. Kilpatrick. Mr. George Walmsley, Assistant Manager of the Londonderry Gas-Works, has been appointed Manager; Mr. R. J. Skinner having resigned. The Lurgan Urban Council have decided to increase the price of gas from 4s. 6d. to 5s. 6d. per 1000 c.ft., to meet a deficiency of £1300 on last year's trading. The Wexford Gas Company, Ltd., announce that from Oct. 1 the price of gas will be reduced by 1d. per therm, equivalent to 4½d. per 1000 c.ft. Messrs. Walsh and Kirwin, who have taken over the Dungarvan (co. Waterford) Gas-Works, have notified consumers that the price of gas will be reduced from 11s. 9d. per 1000 c.ft. to 10s.; and that, if over 9000 c.ft. be consumed at the end of the collection period, the price will be fixed at 6s. 9d. per 1000 c.ft.

South Australian Gas Company.—The accounts of the Company (who carry on business in Adelaide) for the year ended June 30 show a profit of £70,622; and from a total amount at disposal of £88,462, the dividends payable for the year will absorb £59,793, leaving a balance to go forward of £28,669.

Maclaurin Plant at Dalmarnock.—The Glasgow Corporation recently decided to instal a 5-unit battery of Maclaurin producers at Dalmarnock for the manufacture of smokeless fuel and for the supply of industrial gas to the Dalmarnock Electricity Station. Following this decision, the Electricity Manager was instructed to advise the Committee as to the suitability of gas for firing water-tube boilers; and he reported that there is no reason to doubt that gas forms an ideal firing medium for the present type of boilers as used in Glasgow.

The Newport (Salop) Urban Council have accepted the tender of the local gas company to light the street lamps for the sum of £205 10s., less a discount of 5 p.ct.

A discussion arose at a meeting of the Droitwich Board of Guardians last week as to whether the Board should instal a gas cooking range or a coal range in the kitchens. It was decided by a majority of six votes to instal a coal range.

For stealing 60,000 c.ft. of gas, Herbert Reade, a Grimsby motor mechanic, has been sentenced to four months' hard labour. His gas supply was cut off three years ago because of an unpaid account. By making a connection with the main, Reade had since obtained an unauthorized supply for domestic and business purposes.

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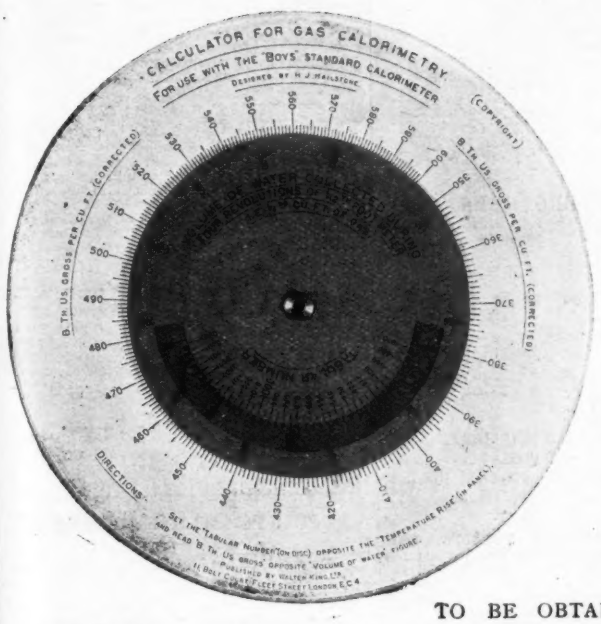
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